The 1st Annual Research Session

ARSFOT 2022

Proceedings of the ARSFOT - 6th October 2022

Organized by
Faculty of Technology
Eastern University , Sri Lanka

Technological Transformation for Sustainable Development

Abstracts of the Proceedings

1st Annual Research Session
Faculty of Technology
ARSFOT-2022

"Technological Transformation for Sustainable Development"

6th October 2022
Faculty of Technology
Eastern University, Sri Lanka

Annual Research Session, Faculty of Technology - 2022

ABSTRACTS

Session Mode: Hybrid

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Annual Research Session, Faculty of Technology - 2022

Faculty of Technology, Eastern University, Sri Lanka is organized to host its 1st annual research session at the Eastern University, Sri Lanka on the 6th of October 2022. The event will be organized under the theme “Technological Transformation for Sustainable Development”. The session tracks are agriculture and food technology, marine and aquaculture technology, energy and environmental technology, water resource management technology, and information and communication technology.

Cover page designed by: Mr. K. Buddhi Chalanga

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Message from the Vice Chancellor

Prof. V. Kanagasingam
Vice Chancellor
Eastern University, Sri Lanka

This is a privilege to me for being the chief guest and giving this message to the proceedings of the first Annual Research Session (ARSFOT-2022) of the Faculty of Technology, Eastern University, Sri Lanka under the theme of "Technological Transformation for Sustainable Development" on the 6th of October 2022.

Research is a "Creative and systematic work undertaken to revisit the stock of knowledge". It includes the unbiased data collection, organization, and analysis of information to refresh understanding of a topic or issue and is a systematic inquiry to describe, explain, predict and control the observed phenomenon. I believe this process should be common for all researches.

The Annual Research Session in the Faculty of Technology covers important tracks such as Agriculture and Food Technology, Marine and Aquaculture Technology, Energy and Environmental Technology, Water Resource Management Technology, and Information and Communication Technology based on the current trends of the country.

The Faculty of Technology is the latest of established Faculties in Eastern University, Sri Lanka, and produced its first batch of graduates this year. I believe that this Annual Research Session provides the opportunity for all researchers to present their findings to an audience of experienced researchers. The endorsements of such intellectuals' presence here will be the strong support to disseminate through the proceedings of publications today. Those will be remembered as one of the annual events that are at the forefront of disseminating technology-related research in the community.

I would like to express my sincere appreciation for the commitment and enthusiasm of the organizing committee of this Annual Research Session.

Finally, I extend my gratitude to all who are participating in this ARS and wish all the researchers for successful presentation of your finding.

Message from the Dean

Dr. T. Mathiventhan
Dean, Faculty of Technology
Eastern University, Sri Lanka

The Faculty of Technology (FOT) at the Eastern University, Sri Lanka (EUSL) was established in 2017, which was originally initiated in 2014. FOT is the youngest faculty at the EUSL.

I am delighted to write this message that the FOT, EUSL is organizing the **First Annual Research Session** (ARSFOT) under the theme of "*Technological transformation for Sustainable Development*" on 6th October 2022. It is a great platform for researchers, educators, students and industries to exchange latest innovative research experiences/outputs, recent development and trends in the field of technological transformation.

The future of the world lies in the hands of the researchers and I am confident that the technology will take the higher priority in any fields such as environment, food, climate, engineering, chemistry, medicine, IT and many more. Therefore, exchanging technological ideas, innovation and transformation generates much interest among scholars, practitioners, and policymakers as a critical instrument for achieving sustainable development and its goals (SDGs).

I hope that the ARSFOT-2022 offers a great opportunity to bring together researchers, scientists, engineers and academicians at regionally, nationally and internationally at large. I take this opportunity to congratulate all the faculty members who contribute their fullest supports to become this event into reality.

I wish the ARSFOT-2022 a grand success.

Message from the Guest of Honor

Prof. Saman Senaweera
University of Melbourne,
Former Director, NIFS, Sri Lanka

I'm honoured to have this opportunity to speak at the Eastern University of Sri Lanka's First International Conference on the Faculty of Technology- Technological Transformation for sustainable development. I extend my congratulations and commendations to the conference's organising team. This is undoubtedly a wonderful day for you all, and I'm delighted to be experiencing it with you. One of the favourite aspects of my job is mixing and mingling with young people. I regret to say that I will have to miss the event due to travel schedule restrictions.

The Eastern University of Sri Lanka has six faculties and a campus in Trincomalee, expanding its operations. The University is home to over 8000 students overall, representing various communities. The university is one of the top-tier young universities in the Country, which is very a proud achievement for the entire country and the Eastern Province in particular. The ultimate achievement index a university can show the rest of the world is its academic ranking. Your university has achieved this and has risen to the top ten in the country despite being a regional university. I wish and encourage all faculty, staff and students to work conscientiously to further improve it.

The newest addition to the Eastern University is the new Technology faculty. This faculty was established as part of introducing new undergraduate programmes into the Sri Lankan university system which will provide an opportunity for those who want to work in industry or further their education in the technology field. Graduate education in this field also includes entrepreneurship training. It is envisaged that a new generation of young businesspeople will emerge in the nation as a direct result of the specialisation of the faculty.

The change in the model of the education system is timely, and the country desperately needs it. Particularly, our country is going through a very difficult period that impacts every aspect of everyday life, including industries, academic institutions, and the whole society. We all have a major role to play in rescuing the country, particularly all young graduates. I urge all of you, graduates, to embrace and contribute in whatever way possible. I'm also very confident that " technology," is the catalyst to pull out this country from this deep

economic crisis. I urge every graduate to contribute something new to improve the economy and sustainability of our society.

The COVID pandemic caused many drastic change in the world. However, two major technologies, vaccine biotechnology and internet technology aided in the recovery from this catastrophic disaster. For example, Internet technology moved in and helped all industries to operate without interruption. At that time, without the Internet, the entire world would have collapsed. For instance, even in Sri Lanka, all the educational institutions were able to operate, both schools and universities without being crippled. Before, we never thought of whether we will be able to move into a 100% online operation. It was simply possible because of the advancement that we had made in internet technology. This technology also provided new distance learning opportunities for most rural communities. Now, the whole country be it rural or urban is familiar with this technology. Now students in rural areas have access to the best educational facilities in the country. Another good example is the Advanced Level results for this year; It has been better in rural sectors despite having all other limitations. Further, if anybody wants to get a degree or diploma from an overseas university, now it is possible through online education. Through this technology, many opportunities open up. Internet technology, what we see today is the tip of an iceberg. There are a lot of opportunities in the area of internet-based technology for young entrepreneurs to be utilized and improve upon.

We were able to get out of the COVID pandemic so swiftly due to vaccine research and development. Vaccine development has now advanced by several generations. In the early stage of the discovery of vaccination, they used attenuated vaccine – live- attenuated microorganisms; Inactivated vaccine – inactivated organism; toxoid- inactivated toxic compounds; Subunit vaccine – use of a fragment of toxin; RNA vaccine- RNA vaccine is made of nucleic acid RNA encapsulated inside of a vehicle such as lipid nanoparticles; DNA vaccination - Injecting viral or bacterial DNA into human or animal cells to trigger immune system recognition. Among all, DNA and RNA vaccines, which are the most common and powerful forms, use cutting-edge technology for production. Sri Lanka does not even have a primary-level vaccine production facility in the country. If a new disease of a Sri Lankan origin emerges, we are all in jeopardy; investment in this type of research and development is critical in developing the country's knowledge, health and economy.

We have not fully utilised technology in agriculture, which is why our agricultural productivity is very low and not sustainable. Even though we have an ideal environment for all types of agricultural endeavours, the country's agricultural sector is struggling to advance. Converting to total organic agriculture reversed whatever progress we have

made in the agriculture sector in the past 40 to 50 years. Now, nearly two years after the decision "country for total organic agriculture" food production has decreased significantly, by between 30 and 40 per cent. This decision threatened our food security, as well as the economy and sustainability of the entire nation. We used to have a 4-billion-dollar agriculture-based industries, but that number has decreased to 1 billion dollars in 2021. A few years ago, we were able to produce enough rice for the entire country, even at that time, the industry was unprofitable. Farmers never had the opportunity to improve their standard of living and they always lived below the poverty line. If agriculture continues to operate in this manner, the entire farming community will only be able to just survive. Eventually, they will leave agriculture, and thus the whole country will become highly dependent on international donors for our food security.

Sri Lanka is blessed with a climate suitable for all types of crops, with an average temperature of 10 to 28 degrees Celsius, an annual rainfall of 750 to 7500 millimetres, a minimum of 12 hours of good sunlight, and a very fertile soil system. Managing and integrating these variables in a scientific manner is the key to increasing productivity. For example, you can use global references for rice yield. Countries such as Japan, Australia, China, and many others produce more than eight metric tonnes rice per hectare. In our case, it was only 4 MT per hectare in 2018, before the organic revolution. If we can lift our rice yield to 5MT per hectare, farmers' income will increase by nearly 20%. Not only the farmer's income, all consumers and the country will benefit. I am confident that the agricultural economy can be easily doubled. We require innovative leadership in the sector, where young entrepreneurs can play a significant role in the mission to restore agriculture.

Although there have been numerous advancements in agriculture technology, the nation has not yet benefited from these technologies. For example, plant breeding, crop modelling tools, and nutrient management technology, use of Drones, satellite photography, crop sensors, weather forecasting tools, automated irrigation, light and heat control, intelligence software for pest and disease modelling, and GPS technology are heavily used in other parts of the world. Among all, the most difficult is breeding for higher yield potential, and other countries are investing heavily in this area of research. Numerous technologies are used in plant breeding science, including Pedigree Breeding; Ideotype Breeding; Population Breeding; Hybrid Breeding; Mapping Genes of Interest; Marker-Assisted Selection; recombinant DNA technology; gene editing using CRISPR CAS 9; high throughput phenotyping; metabolomics, whole genome sequencing; proteomics; genomics, and other omic sciences. Using this technology, the yield potential of plants,

their resistance to disease and nutrient toxicity, pests, diseases, drought, frost, and floods have been enhanced for many crops. Unfortunately, we have barely adopted this technology in our crop improvement programs.

I believe it is time to invest in this area of agriculture technology if we are serious about addressing the nation's long-term food security and sustainability. This industry should be a profitable industry that brings dollars into the country, and all farmers should be able to live above the poverty line. A big part of this task belongs to all of you. I've opened up a number of possibilities for you to contribute through innovation. I hope this will assist you in making a positive contribution to the country through your innovative leadership. I hope your conference is extremely productive. My heartiest congratulations and best wishes to all of you.

Thank you.

Message from the Coordinator

Mr. T. M. S. A. Tennakoon
Coordinator, ARSFOT-2022
Faculty of Technology, EUSL

It is my great pleasure to deliver this welcome message as the coordinator of the prestigious 1st Annual Research Session, Faculty of Technology, Eastern University, Sri Lanka (ARSFOT-2022), and warmly welcome you all gathered here to glorify this occasion ARSFOT-2022 which has been organized with the theme of "Technological Transformation for Sustainable Development" as a hybrid conference. Technology is a fast-growing field of study worldwide, and it's crucial to increase production and efficiency in the industrial sector of Sri Lanka. The ARSFOT-2022 brings together with academics, researchers, and professionals to encourage technological changes for sustainable development. Among the many conferences hosted by various academic circles, the ARSFOT-2022 stands out since its focus is on disseminating multidimensional new research discoveries most relevant to technological transformation for sustainable development.

On behalf of the ARSFOT-2022, I would like to thank all the distinguished invitees, authors, reviewers, participants, and well-wishers. I take this opportunity to express my heartiest gratitude to all the members of the organizing committee of the ARSFOT-2022 and all the academics, students, and non-academic staff of FOT, EUSL, who sacrificed their valuable time to make this event a great success. The organizing committee believes that spending time at the annual research session would be more productive and will promote passion among communities to improve the technological sector in Sri Lanka. Further, I would like to pleasantly request from you all to put the knowledge gained from this research session into practical action for the betterment of the technological sector in Sri Lanka. Therefore, the ARSFOT should continue being the standard of the Faculty of Technology, Eastern University, Sri Lanka, gaining ground as an entity perpetually with features unique to itself.

Message from the Secretary

Dr. R. M. D. Anuruddha
Secretary, ARSFOT-2022
Faculty of Technology, EUSL

It is my utmost pleasure to use this opportunity to thank all members of the scientific fraternity who have contributed to the 1st Annual Research Session-2022 (ARSFOT-2022), Faculty of Technology, Eastern University, Sri Lanka...!

First and foremost, my thank goes to the vice chancellor of Eastern University, Sri Lanka, Prof. V. Kanagasingam for providing us the guidance and official support to make this process a success. Then, my sincere thank goes to the Dean of the Faculty of Technology Dr. T. Mathiventhan for providing us with the framework, resources, and leadership to the organizing committee. Also, it is my duty to extend thank you note to all track chairs, who assessed each submission with dedication and guided authors at each step of the way. All the invitees including the chief guest, guest of honor, keynote speaker, and resource personnel of panel discussion made this session elevated to a higher level by contributing and offering their expertise to the events of ARSFOT-2022. We recognize that effort and please accept my gratitude and appreciation.

We have connected with many reviewers who performed the duties of assessing the submissions. Without them, it would have been impossible for us to reach this stage of ARSFOT-2022. On behalf of ARSFOT-2022, I extend my gratitude and sincere thanks to the reviewers. It is a wonderful experience to observe the enthusiasm seen among students of the Faculty of Technology, Eastern University toward ARSOFT-2022. They contributed and fulfilled multiple tasks as volunteers for ARSOFT-2022. Dear student, we thank you and value your immense support. All the organizing committee members of ARSFOT-2022 worked extra hours, relentlessly while coping with already busy time schedules. I use this opportunity to thank all my dear friends of the ARSFOT-2022 organizing committee. It is certain that we made an impact on our fields of interest by organizing this symposium under very severe restrictions that riddled our societies for quite some time. I am sure we bring novelty to the technology-centered tracks that we have selected as platforms at ARSFOT-2022. Finally, I congratulate authors and fellow elements of the technology-driven scientific community who have overlapped with the ARSFOT-2022 mechanism through any form of contact.

Message from the Editor

Eng. A. Janarth
Editor, ARSFOT-2022
Faculty of Technology, EUSL

Dear authors, reviewers, and readers……!

It gives me immense delight to wish you all success researcher, from the proceedings of the First Annual Research Session 2022.

I feel honored and fortunate to be a part of this peer-reviewed research proceedings and are working as a highly effective team to ensure it continues to be a trusted source in the relevant field of technology.

The turbulent times of 2022 have witnessed the importance and necessity of diversity, and we are proud to have diversified research findings in our proceedings.

As an editor, I do not believe in rushing into shortcuts that might work in getting more reach for the articles. Instead, we should find better articles that discuss new ideas and research directions, original articles that can create deep interest in the readership of the proceedings and content that the researchers do not want to miss and our published papers are not an exception.

I am extremely excited to be embarking on this very important role and wish to express my gratitude to the leadership and the selection committee of the ARSFOT-2022 and our editorial board members for their great support and I would like to thank all the anonymous reviewers and contributors for their timely effort and I would also be extending my thanks to all the academic and non-academic staffs for their valuable support.

Brief of Keynote Speaker

Prof. Samantha Chandranath Karunarathna

Center for Yunnan Plateau Biological Resources Protection and Utilization, Qujing Normal University, China.

Dr. Samantha C. Karunarathna works as a professor at the Center for Yunnan Plateau Biological Resources Protection and Utilization, College of Biological Resource and Food Engineering, Qujing Normal University, Qujing, Yunnan Province, P.R. China since March 2022. Dr. Karunarathna completed his B.Sc. special degree in Botany at the Faculty of Science, the University of Peradeniya in 2006. After completing his bachelor's degree, he served as a lecturer at the Faculty of Applied Sciences, the Rajarata University of Sri Lanka from 2007-2009. He obtained a Ph.D. in Mycology from Mae Fah Luang University, Thailand in 2016. Dr. Karunarathna has published more than 200 SCI publications to date with an H-index of 35 and 6500 citations and is a co-author of three books. Dr. Karunarathna serves as editor of a number of international SCI journals in the field of fungi research such as Phytotaxa, Frontiers in Cellular and Infection Microbiology, Frontiers in Microbiology, Frontiers in Fungal Biology, Agronomy, Journal of Fungi, Diversity, and Biology.

ABSTRACT OF THE KEYNOTE

The remarkable potential of fungi

Fungi are a relatively understudied group yet an essential, charming, and valuable group of organisms with an implausible biotechnological potential for industrial applications. Around 150,000 out of approximately 13.2 million fungi have been identified and described. Because of fungi's cosmopolitan habitats and the need to compete against various other fungi, bacteria, and animals, various survival mechanisms have been developed in fungi. The unique characteristics of fungi thus provide great potential for their application in biotechnology and industry. It is unforgettable that fungi have gifted human beings with cyclosporin, lovastatin, penicillin, and other globally important drugs. Furthermore, fungi can be cultivated with comparative easiness, making production practicable. The exploration of novel fungi and maintaining a living fungi collection both have implausible economic potential in finding fungi with industrial uses that lead to novel products.

Considering the enormous benefits fungi provide, they can be classified into several major categories such as strategies against human disease; strategies against plant disease; enhancing crops and forestry; food and beverages; saving the planet; and commodities.

The discovery of the first antibiotic “penicillin” in 1928 started the golden age of natural product discovery that peaked in the mid-1950s. Among the many antibiotics that were discovered over the last 50 years, a few were derived from fungi such as Penicillin, Cephalosporin C, Fusidic acid, Pleuromutilin and Retapamulin. Antimycotic drugs have also been developed from fungi such as Griseofulvin; Pneumocandin B0, Enfumafungin, Favolon and Sporohrioide. Scientists over the decades finding ways to combat infectious diseases and biofilm inhibitors are one of the several promising methods. Fungal metabolites have been developed as effective biofilm inhibitors such as Coprinuslactone, Microporenic acid A and Roussoellenic acid. Several promising natural products have been derived from fungi that are effective as anticancer agents and are currently in the clinical and preclinical developmental stage such as Irofulven, illudin S, Aphidicolin, Leptosin F, and Leptosin C. Many fungi, such as *Agaricus bisporus, A. campestris, A. subrufescens, Cyclocybe aegerita, C. cylindracea, Hericium erinaceus, Ophiocordyceps sinensis* and *Tremella fuciformis* are used as medicine for the treatment of diabetes. In addition, mushrooms such as *Antrodia camphorata, Ganoderma spp., Hericium erinaceus, Lignosus rhinocerotis* and *Pleurotus giganteus* are well known for improving the peripheral nervous

system. Mushrooms have been used in traditional Chinese medicine for thousands of years, and this has been gradually distributed to Japan and other Asian countries. Some well-known medicinal mushrooms used in traditional Chinese medicine are *Agaricus subrufescens, Cordyceps militaris, Ganoderma lingzhi, G. sinense, Grifola frondose, Hericium erinaceus, Lentinula edodes, Lycoperdon pyriforme, Ophiocordyceps sinensis, Trametes versicolor, Wolfiporia cocos,* and *Xylaria nigripes.* The genera Auricularia, Ganoderma, Grifola, Ophiocordyceps, Pleurotus, and Tremella have been reported to contain cholesterol-lowering compounds. Several fungal metabolites Hinnuliquinone, Stachybosin D, Integrastatin A, Stachyflin, Vanitaracin A, 4-hydroxypleurogrisein, Cytosporaquinone B, and Rhodatin have been reported to possess antiviral activities for human immunodeficiency virus)HIV(, influenza virus, herpes simplex virus)HSV(, hepatitis virus and other viruses such as enterovirus-71, and respiratory syncytial virus)RSV(. Immunosuppressive drugs have been derived from fungal fermentation such as Mycophenolate mofetil, Mycophenolic acid and Cyclosporin A.

Fungi have also been used to control plant diseases, pests, and nematodes, and some fungi can be utilized as herbicides. Endophytic fungi isolated from various host plants such as Alternaria, Chaetomium, Cladosporium, and Trichoderma have shown successful biocontrol abilities against pathogens. Entomopathogenic fungi such as *Beauveria bassiana, Beauveria tenella, Lecanicillium lecanii, Isaria spp.,* and *Metarhizium anisopliae* are known to produce insecticidal compounds, and products developed from those fungi are used as biocontrol agents against insect pests. Several nematode parasitic fungi with nematode trapping abilities such as Stylopage, and Cystopage belonging to Zoophagomycota; Arthrobotrys/Orbilia, Dactylellina/Orbilia, Drechslerella/Orbilia, and Gamsylella/Orbilia belonging to Ascomycota and Hohenbuehelia belonging to Basidiomycota have been reported.

In addition to the above-mentioned applications, fungi have many other biotechnological applications such as biocontrol of weeds and herbicides from fungi; fungal antagonists in post-harvest disease control; biocontrol of rusts and smuts by antagonistic fungi; enhancing crops and forestry by fungi; biofertilizers; arbuscular mycorrhizae as biofertilizers; application of ectomycorrhizal fungi in forestry; use of orchid mycorrhizae and endophytes in biotechnology; growth promoting hormones from fungi; mushroom cultivation; using fungi to enhance food value; food coloring from filamentous fungi; food flavoring; fungi in making tea; wine, beer and spirits; functional foods and nutraceuticals; harvesting the untapped probiotic potential of fungi; agricultural waste disposal; mycoremediation; mycofumigation; biomass to biofuel; mycomaterial production; fungal degradation of plastics; polycyclic aromatic hydrocarbon degradation; fungi and cosmetics; agarwood; fungal enzymes; preservatives; organic acids and textile dyes.

Fungi have various potential uses, but their potential application research is poorly supported overall. On the other hand, much of the studies carried out in academic fields are fundamental, even in biotechnology and applied mycology. This presentation discusses different aspects of fungi that can potentially be utilized with examples from our work and other renowned researchers.

Mycelium-based Material Properties and 3D Printing for the Grow Fossils Structures and Crafts; A Bibliographical Review

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Abstract

Mycelium properties are useful in bio designs that integrate design biosystems frequently to improve ecological performance, as opposed to using fiber or plastics. With this said, we primarily aimed this review study to identify mycelium technology and 3D printing technology for reconstructing fossil structures and artifacts. This review examined the factors that mycelium employs to create fossil and craft structures, as well as how 3D printing is used to reconstruct fossil structures and crafts. We utilized the Google Scholar search engine to screen out scholarly articles on "fossil structuring and crafting using mycelium" from 2000 to 2021 through a bibliographic approach. *Schizophyllumcommune* sp., *Pleurotusostreatus* sp., *Ganodermalucidum* sp., and *Byssomerulius corium* are well-known fungi strains used to produce mycelium-based materials. The substrate has the most impact on physical and mechanical properties, but interfacial bonding at the mycelium-substrate interface is also crucial. Mycelium's interfacial bonding properties will vary depending on its formation method. The mechanical properties of mycelium-based materials, such as their ability to bind and act as a filler, vary, and the physical strengths vary depending on the hot-cold pressing, temperature sensitivity, and water absorption properties. Compared to procedures and substances, the energy cost, cost, and stiffness are low in mycelium-based materials. The cost per cubic meter is between 10^4 - 10^6 times less than that of Styrofoam, Polyurethane foam, clay brick concrete, etc. In addition, chitin-glucan extracts from mycelium were found to have numerical strengths ranging from 25 MPa to 200 MPa, highlighting the significance of maintaining a moderate mycelium density in order to control the product strength. Malt yeast medium grown by fungi is introduced into a sterile substrate during the mycelium 3D printing process. The autoclave is the most common method of substrate sterilization. After one week of incubation of the inoculated substrate, the pulp was subsequently utilized to build a three-dimensional structure. After that, it must be incubated and colored appropriately; once the structure is properly set, mycelium can be killed by heating. Due to the unique properties of mycelium, it can be modified and potentially utilized in fossil structures, crafting, and 3D printing that meets future demand.

Keywords: Fossils structuring, Mycelium, Physical properties, Review, 3D printing

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Market Survey of Personal Care Products Leading to Inland Micro Plastics Pollution in Sri Lanka

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Abstract

Micro plastics in personal care products have accelerated micro plastic pollution, thus scientists attempt to discover the pathways and quantify micro plastic contamination in inland water ecosystems. Hence, this study aimed to identify the main personal care products and their usage patterns by the public and investigate the awareness of the availability of micro plastics in personal care products in Sri Lanka. The individual responses (n=312) on personal care product usage and frequency were obtained via a questionnaire survey using a random sampling technique. The Cronbach's alpha reliability test was followed using IBM SPSS software to check the reliability of the collected study data (The Cronbach's alpha reliability value: 0.854). Most used personal care products were toothpaste (95.8%), soap (91.7%), shampoo (90.7%), hand wash (71.8%), face wash (63.8%), and conditioner (58%). The usage rates (per day) were noted as toothpaste (twice; 75.6%), shampoo (once; 58.3%), soap (more than twice; 51.9%), and shampoo (once; 50.96%). Notably, 77.2% of respondents asserted the unavailability of the wastewater treatment plant in the residential area. Furthermore, respondents claimed that wastewater discharged from households' residents is directed into a soakage pit (40.3%), sewer, or drainage networks (23.1%) while 35.9% of respondents revealed that generated wastewater is directed into the home gardens, lands, or nearby water body. The findings of the study depicted that 25.5% of the sampled population was unaware of the presence of micro plastics in personal care and cosmetics products, and 39.7% of the population was aware of the micro plastic presence while remaining portion stated that they have no awareness. In addition, 49.5% of respondents disagreed or strongly disagreed and 34.4% of respondents were neutral with the fact that personal care and cosmetic products in the Sri Lanka market are environmentally friendly. This study highlights the necessity of further scientific studies on micro plastic emissions and the proper treatment of wastewater to abate micro plastic contamination.

Keywords: Personal care products, Micro plastics, Emissions, Contamination

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Composite Eco-Friendly Sound-Absorbing Materials Using Various Natural Fibers

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Abstract

Fibrous materials have the potential to absorb thermal and sound energy by viscous effect and thermal conduction in between air and the absorber. In recent years, natural fibers have played a main role as a substitution for synthetic sound absorption materials because of significant environmental impacts and health issues. Different natural fibers, Rice Hay, Hair, Coconut Fiber, Banana Fiber, Tea-powder, and Areca-nut Fiber were used as raw materials to synthesis sound absorbing mats while wool was chosen as a synthetic material to compare with natural fibers. Sound absorbing mats with different natural fibers were obtained by mixing fibers with an adhesive (Polyvinyl alcohol stabilized polyvinyl acetate emulsion - Ritefix) and by compressing under a known force (10 N). The measurements were observed using a modified impedance tube and the Sound Absorption Coefficient for Comparison (SACC) was calculated using a derived mathematical model. This investigation concluded that the absorption ability of natural fibers increases with the frequency within the frequency range 100 -10000Hz and at low frequencies (100 - 700 Hz), the distribution of SACC has shown a higher variation compared to the SACC at high frequencies (800 - 10000 Hz). Hair, Coconut fiber, and Areca-nut fiber have reached a saturation level within the frequency range 800 - 10000 Hz and shown the SACCs in between 0.90 - 0.99 while Rice hay, Banana fiber, and Tea powder have shown variations continuously ($0.30 < SACC < 0.99$) within the tested frequency range (100 - 10000 Hz). According to the observations, the distribution of the SACC in hair is the most comparable with the distribution of SACC for the selected synthetic material (wool). The produced eco-friendly sound absorbing mats can be used to control the noise and vibration in industrial machines, home appliances, vehicles, and buildings (on the roofs and walls of auditoriums, concert halls, theatres, etc.) and also as carpets, curtains and other canvas materials by mixing with the suitable resins and after the pretreatment processes (NaOH) as most of them have shown considerable absorption ability throughout the tested frequency range.

Keywords: Sound absorption, Natural fibers, Synthetic, Frequency range

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Production of Eco-Friendly Handmade Paper from Waste Papers and Paddy Waste

L. G. K. D. P. Liyanage[1], P. R. Fernando[1], D. P. Ubeysekara[1*]

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Abstract

Most of the agricultural waste materials such as Rice Straw (RS), Rice Bran (RB), and Rice Husk (RH) do not reach a substantial commercial value today and burning of the byproducts from the agricultural field has become a severe environmental issue in worldwide. Today the paper industry is facing consequence challenges according to the non-availability of good quality raw materials in production. This study is about the suitability of producing hand-made papers using alternative eco-friendly agricultural by-products. In this project RS, RB, and RH were mixed using a blender in a particular order and seven different pulp samples were prepared using Water (250 ml), Waste paper (30 g), and Natural binding material (from Mango tree). The pulp was spread evenly on an A4 size (210 mm × 297 mm) wooden frame and all the seven paper samples were kept under pressure using a machine for three hours. Finally, the samples were tested for their physical properties after drying under the sun for 24 hours properly. The observation values for Density, Grams per Square Meters (GSM) and Young's modulus of sample 1-7 are 0.30, 0.43, 0.34, 1.01, 1.00, 1.18, 1.65 ($\times 10^3$ kgm^{-3}), 91.48, 230.16, 195.57, 271.55, 259.58, 272.33, 280.62 (gm^{-2}) and 8.78, 13.99, 19.18, 18.26, 13.11, 16.78, 7.88 ($\times 10^6$ Nm^{-2}). The standard values for Density of tissues and corrugated-cardboards are in the ranges of 0.25-0.50 ($\times 10^3$ kgm^{-3}) and 0.18-0.30 ($\times 10^3$ kgm^{-3}). The standard values for GSM of book papers, bond papers and cover pages are in the ranges of 44-178, 49-151 and 135-433 (gm^{-2}). The standard values for Young's modulus of cardboard is in the range of 11.9-30.61 ($\times 10^6$ Nm^{-2}). According to the comparison of tested properties with the standard values the sample 1-3 can be used to make tissues, corrugated-cardboards, bond papers and cover pages while sample 4-7 can be used only for rough usages such as cardboard, cover pages. In this investigation, we can determine that all the seven paper samples prepared are suitable mainly for rough usage in the production of cardboard materials which can be used in production of file covers, craft, gift bags and decorations.

Keywords: Agricultural wastage, Hand-made papers, Physical properties, Cardboard

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Remote Sensing Approach on Land Surface Temperature and Urban Heat Islands in Gampaha District, Sri Lanka

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Abstract

Industrialization and urbanization have increased a direct impact on the Land Surface Temperature (LST), resulting the formation of Urban Heat Islands (UHIs). Many countries experience the consequences of UHIs in many aspects such as economic, health, social and environmental effects. The study was aimed to assess the effect of LST on UHIs in Gampaha District for the period of 2008 to 2021 using Thermal infrared bands (TIR) of Landsat images. The study also attempted to map the study area's spatial and temporal distribution of Normalized Difference Vegetation Index (NDVI) and Normalized Difference Built-up Index (NDBI) between 2008 and 2021. The study used cloud free Landsat 4 - 5 MSS/TM (Multispectral Scanner/ Thematic Mapper) and Landsat 8 OLI/TIRS (Operational Land Imager/ Thermal Infrared Sensor) data for 2008 - 2021. TIR bands were used to develop LST maps and Visible and IR bands were used to develop NDVI and NDBI maps of Gampaha District. LST analysis revealed that high surface temperature prevails in built-up areas and low in healthy vegetative areas. The minimum LST ranged from 24-26°C, maximum LST ranged from 30-32°C and average LST ranged from 27.3 - 29°C from 2008 to 2021 in the study area. The highest NDBI were recorded within the built-ups with a range of 0.54-0.72, while higher NDVI values were recorded in vegetative areas ranging between 0.76 and 0.84 from 2008 to 2021. Paired t-test revealed that LST, NDBI and NDVI had significant differences between 2008 and 2021. The positive association between NDBI and LST implies that the built-up region is the primary contributor to UHIs by causing significant surface temperature differences. A negative association was observed between LST and NDVI in Gampaha District for the 13-year period. UHI profile in 2008 and 2021 indicate that UHIs are high in the coastal area which include residential and industrial zone of the district. The study shows that the TIR bands of Landsat 4-5 MSS/TM and Landsat 8 OLI/TIRS have the potential to detect the LST level and UHIs in Gampaha District.

Keywords: Landsat images, Land use Land cover (LULC), NDBI, NDVI

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Impact of Rainfall in the Catchment Area of Hydro Power Plant on Electricity Production from Hydro and Thermal Power Plant in Sri Lanka

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Abstract

This study investigates the impact of rainfall in the catchment area of the major hydro power plants, hydro power plants capacity and the growing demand of electricity on the production of electricity from hydro power plants and thermal power plants in Sri Lanka. Demand for electricity is increasing with economic growth over the years in Sri Lanka. The amount of rainfall in hydro power plant catchment area and hydro power plant capacity are the limiting factors of the production of clean energy from hydro power plant. Electricity production from thermal power plant depends on the importation of fuel and coal and also it pollutes the environment. For this study, data were collected from annual report of Central Bank of Sri Lanka from 1990 to 2019. Annual rainfall in the catchment areas, capacity of hydro power plants, electricity generated from these hydro power plants and electricity generated from thermal power plant annually and annual total sales of electricity were collected for this study. Electricity produced from thermal power plant depends on the electricity production in the hydro power plants. Therefore, a simultaneous regression model was used for this study. This study shows that when the average rainfall in the catchment area increases by 1 %, on average, the electricity production from Hydro power plant increases by around 0.8% while there is no change in the hydro power plant capacity. When electricity generated from hydropower plant increases by 1 %, on average, the electricity production from thermal power plant decreases by around 2.4% while there is no change in the demand for electricity. When total demand for electricity increase by 1%, on average, the electricity production from thermal power plant increases by around 2.3% while there is no change in the electricity generated from hydropower plants. This study will be helpful to the policy makers to predict and make appropriate policy for cleaner energy production and meet the growing demand of the electricity.

Keywords: Electricity, Hydropower Plant, Rainfall, Simultaneous Regression Model

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Refrigeration Sector Maintenance Analysis of Sri Lanka

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Abstract

Refrigerator is one of the most essential appliances, not only in homes but also in many different industries. The refrigerator is one of the few household appliances that run continuously; therefore, it is important to follow correct maintenance. This research discusses about the problems in refrigeration sector maintenance in Sri Lanka. The current study attempts to examine the effects using a structured questionnaire. Three separate Google forms have been prepared for domestic refrigerator users, commercial refrigerator user and refrigerator technicians. Data was analyzed using Google form and Excel. Most of the data collections were carried out via social media. Some of the data were collected from direct questions. The whole study was contained most of the qualitative data so qualitative analysis methods were used to analyze data. The questions were arranged with the aim of evaluating the refrigerator users' knowledge about refrigerator maintenance. Objective of this study is to examine and evaluate the knowledge of refrigerator users and refrigerator technicians on safe refrigerator maintenance in Sri Lanka. Some of the main areas covered in the questionnaire are related to the knowledge about the recommended temperature in the refrigerator compartments, how often the refrigerator interior is getting cleaned, how often the refrigerator condenser coil is getting cleaned, regarding storing hot food in the refrigerator, heat resources near to the refrigerator, how often the refrigerator doors are getting opened, etc. According the survey most of the refrigerators users are not aware of the recommended temperature of the compartment, condenser coil cleaning and refrigerator cleaning. These results show that there is lack of adequate knowledge in refrigerator maintenance among refrigerator users in Sri Lanka. This is directly affecting not only the long term use but also more consumption of electricity to the refrigerator is taking place. With these findings authors are suggesting to provide a proper maintenance guide for users when buying refrigerators and refrigerator technicians should have allowed working in the refrigeration sector after a proper training and certification.

Keywords: Refrigerator, Maintenance, Refrigerator technicians, Refrigerator users.

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Plant Community-based Biophysical and Biochemical Features Feedback of a Flood Episode in Kalu River Basin, Sri Lanka

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Abstract

Extreme flood events cause numerous impacts on human lives, other biotic components, and abiotic components. Especially, plant communities are heavily impacted due to frequent and extreme floods occurring associated with river basins, therefore, acknowledging the recovery and regeneration of plant communities by extreme flood events is important and yet challenging in plant communities' sustainability. To quantify these flood impacts, applications of remote sensing based on derived spatial and temporal variation of biochemical and biophysical features of plants can be used. Hence, the current study aimed to assess the plant communities' effects caused by floods in the Kalu Gang river basin using pre-flood and post-flood events. The present study employed gross primary productivity (GPP), Leaf area index (LAI), enhanced vegetation index (EVI), and the fraction of photo synthetically active radiation (FPAR) of the Moderate Resolution Imaging Spectroradiometer (MODIS). A substantial reduction in EVI, LAI, FPAR, GPP, and vegetation condition index was observed in the post-flood event comparatively. Further, variation of GPP-EVI and GPP-LAI depicted a significant impact fueled by the flood event by limiting the feature in post-flood events. Moreover, the EVI portrayed the highest regeneration (0.333) whereas the GPP showed the lowest regeneration (0.093) in post-flood event. On top of that, the GPP regeneration costs 1.18 years. Finally, the regeneration of GPP and LAI remained low comparatively justifying the magnitude and impact of the flood event. The outcomes of the study are served as sustainable implications of vegetation indices on flood basin management in river basins and cater as a model study for a flood impact assessment on plant communities.

Keywords: Biophysical, biochemical, Regeneration, Remote sensing and River basin

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Residential Water Consumption Behaviour in Hemmathagama Area, Kegalle District, Sri Lanka

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Abstract

In Sri Lanka, as a result of development, the water demand is increasing both in urban and rural areas. This may increase tensions and disputes over the distribution of water resources. Hemmathagama is a town that includes six small villages. The current increase in the population depletes water resources and improves consumer needs, lack of awareness on water conservation is going to create a difficult situation in Hemmathagama. Improvement in household water use efficiency is the only way to reduce the pressure on water demand in a particular area. the survey will be a good way to obtain the required information about water consumption patterns. Hence, this research is aimed to find the water usage, awareness, attitudes, and perception of water consumers in the study area, and also to find the relationships between socio-economic characteristics on domestic water consumption. The study was conducted among one hundred (N=100) households between May 2021 and July 2021. A questionnaire was administered among the sample to collect the data. The data analysis techniques applied were descriptive analysis, correlation, linear regression and one-way ANOVA using the statistical analysis program SPSS version 26.0. Results of the study revealed that the per capita water consumption for the village was found to be 120.09 liter/day. More than half of the households (55%) receive pipeline water. The highest percentage (35.8%) of water is used during a shower in households. The total domestic water consumption is negatively correlated ($p \leq 0.01$) with the age. However, positively correlated with income level and the number of family numbers etc. The data also suggested that most of the respondents (61%) were aware of the cost of water per cubic meter. The majority of the households (32%) use water efficiently to reduce water bills and save money. The percentage of water usage (Bill) cost in the overall income of one hundred households is 0.7%. Nearly 86% of the respondents are mainly concerned about the quality of water. Altogether these findings would help to improve the efficient usage of water by reducing the excessive use of water through different appliances in the Hemmathagama area. This step aims to adopt waste minimization techniques in minimizing waste generation and suggested to have water conservation measures and water irrigation techniques in this area.

Keywords: Domestic water consumption, Per capita water consumption, water quality

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Sustainable Drainage Medium Design Decision Making- Optimization of Porosity of Porous concrete with Compressive Strength

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Abstract

Strom water flooding and runoff are vital evidence of urbanization. Effective land use is inevitable in managing the quality and quantity of the storm water, hence impervious construction is the major cause of storm water runoff by reducing the natural infiltration. Therefore, storm water management is playing a major role in practising a Water Sensitive Urban Design (WSUD) to reduce runoff and flooding. Porous concrete is a mixed combination of Cement, aggregate and water (no fine aggregate) acting as a sustainable solution for drainage which provides natural water to infiltrate through and function as a permeable paving material. Porosity is the major property of porous concrete in evaluating its performance in infiltration while strength deciding its application to the industry. The compressive strength of the porous concrete has an increased relation with compaction, so optimizing the porosity with compaction is inevitable. Choice of aggregate particle size will affect the compressive strength of porous concrete and compaction is the inducing factor. To study the influence of aggregate gradation and compaction on compressive strength and porosity, the cubes with five different aggregate proportions (P-0.1= 10% of 12-18mm) of two size range aggregates (12 – 18 mm and 18 – 25 mm) and eight different level of compaction were practised for two different aggregates to cement ratios of 2.5 and 5.0. The results showed that the compaction-free compressive strength ranges from 5-6 MPa for A/C (Aggregate to Cement ratio) – 5.0 and 5-9 MPa for A/C-2.5 where the porosity range is 0.30-0.35 and 0.35-0.40 respectively and proved the dependency of compressive strength on aggregate gradation. Because of the high paste content in the low A/C Mix-Designs, it was identified that the A/C -2.5 is very sensitive with P 0.5 and P0.4 in optimizing porosity with compaction. Results varied from (0.05-0.28) in porosity and (10-30 MPa) in compressive strength. Other mix designs are not effective in optimization as behaving asymptote after 40 blows. In the case of A/C-5, P-0.5 is very efficient compared to others by resulting in approximately the same porosity of (0.15-0.40) and comparatively higher compressive strength of (8-16 MPa). The rate of strength development with respect to porosity is found to be linear for A/C-5.0 and Power for A/C-2.5.

Keywords: Compaction, Compressive strength, Gradation and Porosity

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Water quality Variation along the Nilwala River of the Southern Province of Sri Lanka

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Abstract

This study intended to investigate the water quality variation and pollution level of the Nilwala river basin in Matara district of Sri Lanka. Water samples were collected at monthly intervals from March 2019 to October 2019 at eight locations along the main river. Water quality parameters such as chemical oxygen demand (COD), biological oxygen demand (BOD), pH, EC, temperature, alkalinity, hardness, chloride, nitrate and phosphate were analyzed using APHA 23rd edition of standard methods for the examination of water and wastewater. Experimental results were statistically analyzed by One-way ANOVA using Minitab 17. The pH (7.2-8.2), EC (0.07 mS/cm-0.32 mS/cm), temperature (27.06 °C - 29.32 °C), BOD (0.4 mg/l - 1.2 mg/l), COD (5.1 mg/l - 18.6 mg/l), hardness (29.8 mg/l as CaCO3 - 85.82 mg/l as CaCO3), alkalinity (25.38 mg/l - 63.57 mg/l), nitrate (1 mg/ l - 2.1 mg/l), chloride (4.5 mg/l - 61.0 mg/l) and phosphate (0.07 mg/l - 0.107 mg/l) concentrations showed statistically significant differences among the each location ($p<0.001$). Guidelines of Extraordinary Gazette Notification by the National Environmental Act No. 47 of 1980 No. 2148/20, were used to find the quality and pollution levels. All locations of Nilwala river except the Bandaththara power plant area and Matara bridge were suitable for bathing, recreation, agriculture, aquatic life and drinking purposes. The COD level of the water at Bandaththara power plant exceeded the maximum limits. In addition, temperature was relatively high due to the boiler action of the power plant. Though the water is unsuitable for drinking, bathing, recreation and aquatic life, it is suitable for agriculture. Matara urban area has the highest hardness (85.82±0.03 mg/l), chloride level (61.0±0.02 mg/l) and EC (0.32±0.004 mS/cm). This area is unsuitable for bathing, recreation and drinking and is favourable for aquatic life. Water at Sapugoda showed the highest alkalinity (63.57±0.1 mg/l) which may be due to the mixing of agrochemicals from the existing paddy cultivation on both sides of the river. In conclusion, Bandaththara power plant area and Mahanama bridge in Matara of Nilwala river are not suitable for drinking, recreation and bathing while, whereas other sampling locations are suitable. However, the Nilwala river is not polluted with phosphate.

Keywords: COD, Nilwala River, pH, Water Analysis, Water Pollution

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Study on Low-cost NODE MCU ESP8266 Soil Moisture Sensor in Monitoring Soil Moisture Content under Different Types of Land Uses

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Abstract

A study was conducted to develop a soil moisture sensor interface with NODE MCU ESP8266 micro-controller and to assess its efficiency in various land uses over oven dry methods. The developed soil moisture sensor had improved features, including a Wi-Fi internet module and NODE MCU ESP8266 sensors. Storing all moisture data in the SD card RTC module in real-time is another advantage of the developed sensor. Field applications to test the efficiency of the sensor was carried out in 05 different types of land uses, namely, leafy vegetable land, paddy land, orchard land, natural vegetation land and water source land. Paired t-test was carried out to examine the significant difference between oven dry and sensor soil moisture measurements. The statistical results revealed that the oven dry and sensor methods showed significant differences in soil moisture content in paddy land and water source land. In contrast, soil moisture content showed non-significant differences in leafy vegetable, orchard and natural vegetation land at 5% significant level. Model comparisons were conducted to examine the efficiency of soil moisture sensors over the oven dry method. The results showed that the NODE MCU soil moisture sensor is more effective in orchard land (83%) and leafy vegetable (76%) land and moderately effective in natural vegetation land (65%) to replace the oven dry measurements. The study revealed that the NODE MCU soil moisture sensor can be used effectively in orchard, leafy and natural vegetation land. The sensor is also suitable to measure the readily available water in the soil to ensure irrigation efficiency in the field.

Keywords: Arduino IDE, I2C module, Oven dry method, RTC module, Sensor method

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Investigating the Feasibility of Locally Available *Moringa oleifera* to Treat High Turbidity Water

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Abstract

Turbidity impacts directly on the water treatment process. Some of the water treatment plants (WTPs) in Sri Lanka got shut down during monsoon rains due to the high turbidity of raw water resources. Usually, chemical coagulants which are imported from other countries are added to reduce turbidity during water treatment processes. Due to the prevailing economic crisis, importing coagulants from other countries is very difficult. Therefore, this study investigated the feasibility of locally available Moringa Oleifera to treat high turbidity water. The questionnaire survey was carried out for the nine WTPs to know the highest turbidity levels they have experienced during the last five years. According to the responses, two WTPs experienced turbidity levels of more than 500 NTU while the maximum turbidity level for five others was between 100-500 NTU. Only two WTPs had a maximum turbidity level of less than 100 NTU. The WTPs in the dry zone have shown higher turbidities during monsoon rains. After going through the responses, this study focused on two turbidity ranges 500-600 NTU and 100-200 NTU, and using the Jar test, the coagulant performances of Moringa Oleifera against two turbidity ranges were studied. The tests were carried out using totally with Moringa Oleifera and a combination of Moringa Oleifera and Alum. By using Moringa Oleifera as the only coagulant, 550 NTU was reduced to 146 NTU (71.4%) and 167 NTU was reduced to 74 NTU (55.7%). Combining Moringa Oleifera and Alum has obtained 562 NTU to 4 NTU (99.3%) while 170 NTU to 3 NTU (98.2%) with optimum dosages of Moringa Oleifera and Alum 60 mg/l and 40 mg/l respectively. Use of Alum can be reduced by 0.04g/l by combinedly used with Moringa Oleifera. By using this locally available natural coagulant the water treatment process can be done easily, suitably, and effectively at a low cost.

Keywords: Alum, *Moringa oleifera*, Natural coagulant, Turbidity, Water treatment

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Impacts of Different Heating Temperatures on Soil Water Repellency: A Laboratory Approach Using Pine Forest Soil from Different Depths

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Abstract

Soil water repellency (SWR) primarily lowers the water infiltration into the soil, influencing the surface and subsurface soil hydrology. The soils beneath waxy and resinous plant species such as Pine are typically water-repellent. Wildfires frequently occur in these forests owing to the waxy litter materials, altering the soil properties, including SWR. Hence, this experiment aimed to study the effects of different heating dynamics on SWR through a soil profile using the *Pinus caribaea* forest soil. Soil samples collected from four different depths (0-5, 5-10, 10-15, 15-20 cm) exposed to seven heating temperatures (H_T) (50,100,150,200,250,300,350°C) separately for a period of 1 h. The SWR of the samples was measured using water drop penetration time (WDPT) test. Before heating, the samples from 0-5, 5-10 and 10-15 cm showed water-repellent conditions (WDPT= >3600, 270±15, 2±1 s, respectively), and showed alterations in SWR with heat treatments. Soils taken from the deepest soil layer (15-20 cm) were completely wettable (WDPT= 0 s) and showed no change in SWR at any H_T. SWR of 0-5 cm layer remained extremely repellant (WDPT= >3600 s) up to 150°C and decreased with increasing H_T to be completely wettable at 250°C. With increasing H_T, the SWR of soils from 5-10 cm increased up to 100°C, and decreased beyond that to be wettable at 200°C. SWR of 10-15 cm layer also showed a similar trend as 5-10 cm layer but became wettable at 150°C. The heat can alter both content and composition of soil organic matter resulting heat-induced alterations in SWR. The H_T influenced SWR, and the alteration SWR with heat changed with the initial SWR levels. Lower H_T (~100°C) increased SWR, and this might adversely affect water infiltration. Since the alteration in SWR might change with the duration of exposure, further studies are necessary to find the impacts of longer or shorter exposure times.

Keywords: Heating effects, *Pinus caribaea*, Soil water repellency, Wildfires

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Effect of Treated Domestic Wastewater Irrigation on Growth and Yield of Okra (Abelmoschus esculentus).

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Abstract

Wastewater reuse could save a considerable volume of freshwater currently used for irrigation and make this resource available to meet the growing needs of freshwater. Treated municipal wastewater is a valuable water source for crop irrigation, a common practice in many countries. The present study was carried out to evaluate the effects of treated wastewater on the growth and yield of okra (Abelmoschus esculentus) (Variety - Haritha). The experimental design was a Randomized Complete Block Design with replicates having two treatments and three blocks as T1- Groundwater irrigation to okra and T2 - Treated Domestic wastewater irrigation to okra. The growth and yield parameters such as plant height, leaf area, taproot length, fresh and dry weights of the shoots, fresh and dry weights of roots and Water Use Efficiency (WUE) were recorded. The results revealed that the plant height, leaf area, taproot length, dry weight of shoots, fresh and dry weight of roots, yield, and WUE of okra were statistically significant at $p<0.05$. However, no such difference was observed in the fresh weight of shoots. The study concluded that treated wastewater positively impacts okra's growth, yield, and WUE. Therefore, okra could be irrigated with treated domestic wastewater to address the water shortage issues.

Keywords: Growth and yield parameters, Irrigation, Treated domestic wastewater, Water quality parameters

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A Survey of Public Perception and Attitude on Drinking Water Resources in Udunuwara DS Division in Kandy District

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Abstract

Management of water resources has become a challenge, especially in urban areas. Attitude and perception of people regarding drinking water resources are identified as the main causes of many issues in water management. Understanding the public perception and attitude related to water resources is therefore important. The present study was aimed to assess the attitude and perception of different groups of people related to drinking water resources in Udunuwara DS Division in Kandy district. A stratified random sampling method was used to collect data from the general public, university students, and water professionals in the study area. The sampling size from each group was 25. It was found that the perception of the students regarding drinking water resources and related issues is slightly different from the perception of other groups, which might be due to less experience. Nearly 40% of the public assumes that the quality of the groundwater in the study area is not good. However, nearly 55% of the water professionals and 12% of the students believe that the quality of groundwater is good and improving. About 69% of water professionals believe that the quality of surface water is good and improving. Nearly 40% of the students and water professionals believe the quantity of available water is not enough to meet the demand. However, nearly 25% of the public don't aware of it. Respondents from all three groups have an idea of major water pollution sources. The public in the study area is not aware of the role and responsibility of the government and individual citizens towards conserving and protecting water resources. Changes in frequency of watering, fertilizer and pesticide usage, and adopting new technologies in water management are the proposed attitude changes. Further, the awareness level of the general public and students on water issues is not adequate. Hence, necessary steps should be taken to make them aware of issues in drinking water resources in Udunuwara DS division, Kandy.

Keywords: Water resources management, Water-related issues, Water pollution

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Efficiency of Constructed Wetlands in Removing Pollutants from Wastewater- A Review

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Abstract

Constructed wetlands (CWs) systems have emerged as a low-cost higher performing wastewater treatment technology. There are numerous studies conducted worldwide to assess the efficiency of CWs under different operational and environmental conditions. The present study aimed to document the findings of the previous studies for easy understanding and future studies. There are different CWs, each has its advantage and disadvantage. Hybrid CWs integrating horizontal and vertical flows are appropriate for treating concentrated wastewater. Wetland efficacy and behaviour are directly related to temperature, microorganism availability, feeding mode, surface loading rate, hydrology, and substrate and macrophyte composition. Among them, temperature, pH and DO have a direct effect on pollutant removal efficiency. Longer hydraulic retention time and lower loading rate increase the removal efficacy. Microorganisms also play an important role in removing BOD and COD by the process of degradation of complex compounds. Aeration of CWs increases the removal of some pollutants in wastewater. In addition, the selection of vegetation type plays a crucial role in pollutant removal efficiency. The vegetation such as *Cyperus alternifolius*, *Iris pseudacorus*, *Phragmites australis*, *Ipomoea aquatic* and *Lythrum salicaria* are effective in CWs. *Typha latifolia* is the most established vegetation. They can support varied hydraulic conditions and successfully treat high strength wastewater. The usage of some vegetation is limited as they require specific environmental conditions. A proper combination of vegetation shows higher pollutant removal efficiency. Hence, the selection of suitable vegetation types for a CW should be based on its removal efficiency and local climatic conditions.

Keywords: Constructed wetlands, Microphyte, Pollutants, Wastewater

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A Study on the Present Status of Meat Consumption of University Students Amidst the Covid-19 Pandemic: A Case Study in Faculty of Agriculture, University of Ruhuna, Sri Lanka

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Abstract

Agriculture, Eastern University, Sri Lanka a Equally contributed Abstract Although several studies had been conducted to identify the pattern of food consumption for different food commodities, meat consumption attributes among university students in Sri Lanka are yet to be investigated. Also, the effect of covid-19 on meat consumption and the awareness of agriculture undergraduates on the controversial cattle slaughter ban in Sri Lanka are still to be investigated. The objectives of this study were to identify the meat consumption attributes; to investigate the impact of covid-19 on recent meat consumption pattern; to extrapolate the awareness about the cattle slaughtering ban among agricultural undergraduates in University of Ruhuna . A pre-tested questionnaire was employed to randomly collect data from 350 students in four undergraduate batches in the Faculty of Agriculture, University of Ruhuna. Data were statistically analyzed by using SPSS software version 25.0 and Microsoft excel. Spearman's correlation coefficients were used to assess the relationship between religion, locality and meat purchasing frequency. Wilcoxon signed ranked test was used to find out the satisfaction of the respondents on price and the quality of purchased meat. Results revealed that 94% of respondents consumed at least one type of meat, while the first preference of the majority was chicken, followed by pork, beef, and mutton. Raw meat was preferred by 70%. Meat shops were the preferred place to purchase meat by 49.5% of respondents. Over 40% of the respondents purchased meat weekly, while daily purchasers were the lowest. There were no significant correlations observed between religion and locality with meat purchasing frequency ($p>0.05$). The respondents significantly satisfied on the price and the quality of purchased meat. t ($p<0.05$). More than half of the respondents expressed thatthey didn't change their meat consumption, while 10.3% reported that their consumption was enhanced during the covid-19 pandemic. Although 41.8% of respondents agreed with the cabinet paper banning cattle slaughtering, 29.7% agreed that it would positively affect the sustainability of the dairy industry in Sri Lanka. Conclusively, Meat purchasing frequencies were less than fish, and there was no significant impact of covid-19 on meat consumption among university students in Sri Lanka. Though the decision to ban cattle slaughtering in Sri Lanka was an emerging topic, the awareness of the agriculture undergraduates on the effect of this ban on the sustainability of the dairy industry was very low.

Keywords: Cattle slaughter ban, Covid-19, Meat consumption, University students

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Effect of Clarification on Quality of Palmyrah Toddy

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Abstract

Palmyrah toddy, is cloudy, whitish sap, obtained by tapping, and fermented spontaneously with wild yeast. Nevertheless, the availability of the toddy is seasonally limited, therefore it is pasteurized and sold during the off-season by Palm development societies situated in the Northern and Eastern parts of Sri Lanka. Throughout the storage period of the toddy, the suspended particle in the toddy and yeast, accumulate, from turbid and then sediment on the bottom of the bottle. Therefore, this research was designed to eliminate the suspended particle, to improve the quality of Palmyrah toddy via increase the clarification using different filter materials. Palmyrah toddy sample was obtained from the palm development cooperative society (Kaithady, Jaffna, Sri Lanka) and allowed for prolonged (22 hours) natural fermentation under the ambient laboratory conditions (28±2°C). It yielded the highest percentage of alcohol (%) 4.6±0.05 and total acidity (g/mL) 0.36±0.01, turbidity (NTU) 3475±11, Brix value 4±0.05, pH 3.72±0.02, total solids (g/100 ml) 2.1±0.00, TPC (CFU/mL) 93×102, Yeast and mold (CFU/mL) 41×106. Clarification of toddy carried out by pre-filtration set-up using cotton wool revealed that of results were significantly ($p<0.05$) different and showed alcohol (%) 4.3±0.05 and acidity (g/mL) 0.4±0.00, turbidity (NTU) 1264±6, Brix value 4±0.05, pH 3.74±0.02, total solids (g/100 mL) 3±0.08, TPC (CFU/mL) 11×102, Yeast and mold (CFU/mL) 21×106. Followed by Silicon-Sand (8cm height) filtration results were 4.2±0.05 % 0.05(±0.015) g/ml, 830±10 NTU, 4.2±0.1, 4.86±0.02, 1.7±0.08 g/100 mL, TPC (CFU/mL) 6×102, Yeast and mold (CFU/mL) 11×106 respectively. Subsequently, toddy was filtered by using optimized treatment as heated toddy, without charcoal and under vacuum which resulted, in alcohol (%) 4.0±0.05, acidity (g/mL) 0.12±0.01, turbidity (NTU) 833±6, Brix value 3.7±0.1, pH 4.87±0.01, total solids (g/100 mL) 2.2±0.08, TPC (CFU/mL) 7×102, Yeast and mold (CFU/mL) 7×106. Probably, the filtration method with cotton wool pre-filtration and Silicon-Sand helps to reduce microbial load, turbidity in toddy, leading to an increase in the marketing of limpid and satisfying consumer expectations. Not only that it increases the earnings of the societies and leads to an increase in the national income.

Keywords: Clarification, Cotton wool, Palmyrah, Toddy, Turbidity

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Development of a Plant-based Milk Using Tropical Almond (*Terminalia catappa* L.) Nuts

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Abstract

Due to the resemblance in nutritive, functional and sensory attributes, plant-based milk is used as substitute for animal milk. An experiment was conducted at the Institute for Agro Technology and Rural Sciences, Hambantota to investigate the possibility of making plant-based milk using the nuts of Kottamba/tropical almond (*Terminalia catappa L.*). There were two treatments; T1 – milk prepared from well ripened fruits; T2 – milk prepared from green mature fruits. Milk was prepared by grinding the shelled and blanched nuts with water at a ratio of 1:2 (weight basis). Sensory analysis was conducted occupying a panel of 30 members using a five-point hedonic scale. Appearance, odor, flavor, mouth feel and overall acceptability of the product were tested and statistically analyzed using the Friedmann test. Biochemical properties (moisture, crude protein, crude fat, total carbohydrates, total ash, and fiber) and energy content were determined in triplicates and was compared with those of cow's milk. Data were analysed using ANOVA procedures at a 5% significance level. According to the sensory evaluation, T1 was recorded to be the best. The crude protein, crude fat content and fiber content of Kottamba milk were higher than those of cow's milk. Amongst them, the crude fat % was highest in well-ripened kernel-based milk (13.30± 0.01) whereas crude protein % was highest in green mature kernel-based milk (7.40± 0.00). The carbohydrate content of Kottamba milk was less than that of cow's milk. A considerable amount of minerals was also available in Kottamba milk. The study suggests mixing green mature fruits and well-ripened fruits to produce Kottamba milk to improve the nutritional quality, which can be even higher than that of cow's milk. This study reveals the requirement for further studies related to Tropical Almond kernel-based milk as a good source of plant-based milk as well as a potential substitute for cow's milk.

Key words: Plant-based Milk, Tropical Almond

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The Effects of Edible Oil Coatings on the Quality of Chicken Eggs Stored under Room Temperature

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Abstract

The aim of this research was to investigate the effects of edible oil coatings on the quality of chicken eggs stored under room temperature. Fresh chicken eggs (48–52g) were coated with sunflower oil, coconut oil, palm oil and gingelly oil and stored at room temperature (30°C) for 5 weeks. The quality parameters such as weight loss, air cell height, albumin weight, albumin height and yolk weight were determined at weekly intervals. The results indicated that the weight loss, air cell height, albumin weight, albumin height and yolk weight of the control eggs were 1.70%, 2.76 mm, 30.4 g, 4.8 mm and 11.56 g respectively on the initial day and on the 5th week of storage, the weight loss and air cell height increased to 5.63%, and 10.2 mm respectively. However, the albumin weight, albumin height and yolk weight in the control eggs could not be measured after 5 weeks of storage because the egg yolks were broken. Four oil coatings were effective in preserving egg qualities for 5 weeks of storages than the control eggs. The eggs coated with sunflower oil, coconut oil, palm oil and gingelly oil showed weight loss of 0.32%, 0.21%, 0.18% and 0.33% sequentially on the initial day and on the 5th week of storage weight loss increased to 0.89%, 0.70%, 0.35% and 0.76% sequentially and also the air cell height were 2.73mm, 2.73mm, 3.00mm and 3.36mm respectively on the initial day and these values were changed to 4.46mm, 4.50mm, 3.66mm and 4.30mm on the 5th week of storage. The edible oil coated eggs presented minor reduction in albumin weight, albumin height and less increment in yolk weight than the control eggs. Although palm oil coated eggs showed better qualities compared to other oil coated eggs during 5 weeks of storage at room temperature. According to the result, Palm oil can be used as a coating to preserve the quality of chicken eggs during storage under room temperature for up to 5 weeks.

Keywords: Chicken eggs, Edible oil, Quality characteristics, Storage

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Assessment of Drought Tolerance Capability of Five Selected Finger Millet Genotypes in Sri Lanka

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Abstract

Finger millet (*Eleusine coracana*) is one of the most nutritious food crops extensively grown in Asia and Africa. As finger millet is considered the second staple food after rice and maize in Sri Lanka, it is worthy to be subjected to crop improvement programmes. Drought stress contributes significantly to economic yield loses in finger millet. Two cultivated finger millet varieties (*Rawana* and *Oshada*) and three promising accessions (ACC: 7088, ACC: 12415 and ACC: 7090)were screened in a poly-house for drought tolerance using morpho-physiological traits andassessed using 5 selected SSR markers (UGEP10, UGEP24, UGEP60, UGEP78 and UGEP3) widely used in genetic diversity assessment in finger millet. Drought response was assessed using9 morpho-physiological parameters by subjecting plants to withholding of water at 24 days after sowing and continuing water stress till the plants reach the reproductive stage by supplying 0.5 liters of water weekly. Analyzing with the control plants in parallel; indicated that variety *Oshada* performed well under drought stress compared to the other genotypes while *Rawana* indicated more sensitiveness to water withholding. DNA from each finger millet genotypes was amplified using selected SSR markers separately and none of the markers showed polymorphism indicating presence of narrow genetic variation among the studied genotypes.

Keywords: Drought tolerance, Finger millet, Simple Sequence Repeat markers

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Quality Evaluation of Mushroom Powder Incorporated Cake

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Abstract

Mushroom is considered a source of food and medicine throughout the world and it has huge health and nutritional benefits and can solve many problems of undernutrition and malnutrition.Therefore, a research study was carried out to utilize the oyster mushroom powder (*Pleurotus oystreatus*) in the development of value-added cake and to assess its quality parameters. A semi- automated hand blender was also developed as a technological invention using readily availableinexpensive materials. The various ratio of wheat to mushroom powder were used such as 100:00 (T_1), 95:05 (T_2), 90:10 (T_3), 85:15 (T_4) and 80:20 (T_5). Ingredients were mixed and baked in the oven for 25 minutes at 170℃ to make the cake. Each treatment was tested for its physical, nutritional and sensory qualities using standard methods of analysis. The results were analyzed statistically using ANOVA using SPSS statical packages at $p<0.05$. According to the results, the physical parameters of the developed cake such as height, weight, volume and Specific gravity were increased from 4.00 to 4.68cm, 316.45 to 383.98g, 615.43 to 720.57cm^3 and 0.51to 0.53 gcm^{-3} while increasing the mushroom powder from 0 to 20%. The nutritional parameters of cake such as moisture, ash, protein and fat increased from 17.66 to 19.47%, 0.46 to 0.89%, 7.07 to 11.44% and 16.92 to 19.92% and carbohydrate content decreased from 57.81to 49.14% while increasing the mushroom powder from 0 to 20%, respectively. Based on the sensory attributes and overall acceptability, the 15% mushroom powder incorporated cake (T_4)was selected as the best treatment among the other treatments. Therefore, it was concluded thatbased on the physical, nutritional and organoleptic quality characteristics, the 15% Oyster mushroom powder incorporated cake was selected as the best treatment compared to other tested treatments.

Keywords: Cake, Oyster mushroom powder, Quality parameters, Value addition

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Cooking Quality Characteristics and Iron (Fe) Content of Most Popular Rice Varieties in Sri Lanka

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Abstract

Rice (*Oryza sativa* L) is the staple food of Sri Lankans. This study was carried out to investigate the cooking quality and Iron content of the ten most popular rice varieties grown in Sri Lanka, according to the cultivating extent. At 362, Bg 352, Bg 300, Bg 360, Bg 366, Bw 367, Bg 94-1, Bg 358, At 308 and Bg 359, varieties selected for this study cultivated in 2020 *Maha* season in Bathalagoda Rice Research and Development Institute. Brown rice, semi-polished (42s) rice and completely polished (82s) rice of each variety were used to analyze different attributes as gelatinization temperature by index of the alkali digestibility test, amylose content by the simplified method reported by Juliano (1971), volume expansion ratio and water absorption ratio. The rice flour samples of the above varieties were analysed for the amylose content, and Fe content. Fe content was analysed using Inductively Coupled Plasma-Optical Emission Spectrometry (Thermo scientific, iCAP 7000, Thermo Fisher Scientific, USA). The results indicated that At 362 recorded the lowest gelatinization temperature (55^0C-69^0C), Bg 360 and At 308 intermediate (70^0C-74^0C), and the rest of the varieties high gelatinization temperatures(>74^0C). The water absorption ratio increased gradually with the polishing time. Volume expansion ratio of rice varieties was affected considerably by the variety and the extent of polishing. All the varieties were categorized as high amylose containing under completely polished condition which has more than 25% amylose content. Bg 360 showed comparatively a better cooking quality due to high water absorption ratio (2.34±0.06), volume expansion ratio (3.00±0.14) and intermediate gelatinization temperature. Fe content was higher in brown rice than in polished rice because Fe concentration is high in bran layer. There was a significant difference in Fe content among varieties. Fe content was highest in Bw 367 variety, and the lowest in Bg 360 variety. The highest Fe content reduction upon polishing was recorded from Bg 94-1 and the lowest from At 362. Bg 94-1, Bg 360, Bg 300 and Bw 367 varieties recorded a higher percentage reduction in Fe content thus recommended for consumption without polishing to avoid high reduction in Fe content.

Keywords: Brown rice, Iron content, Quality attributes, Polishing condition, Rice varieties

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Development of Fiber Enriched Biscuit Using Jackfruit *(Artocarpus Hetrophyllus)* Rind Powder

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Abstract

Jack fruit *(Artocarpus hetrophyllus)* is one of the most important largest edible fruits worldwide. Compare with other tropical fruits this fruit is excellent source of nutrients and all the parts of the fruit used as food for human diet and as a feed for livestock. With increasing the demand for their nutritional value in the human diet it called a poor man fruit. This study aims to develop value-added and nutritionally enriched especially fiber enriched of biscuit using jack fruit rind powder in biscuit formulation and to characterize the physical and nutritional properties of biscuit through environmentally sustainable technology. Incorporating jackfruit rind powder as a byproduct rich in dietary fiber in biscuit not only provide health benefits but also leads to develop an environment friendly technology by solving the problem of waste disposal of residues. To this effect, jack fruit, rind pieces were under gone through a few soaking and washing steps before being dried and milled in to powder. The powder then obtain was incorporated with wheat flour in different ratio including 0% (T1) control treatment, 5% (T2), 10% (T3), 15% (T4), and 20 %(T5) respectively. The final product was analyzed for the quality parameters such as proximate chemical composition, physical and sensory evaluation. Data of the chemical analysis was analyzed by Analysis of Variance (ANOVA) (α =0.05) and mean separation was done with Turkey's pair wise comparison test with 95% efficiency level. The incorporation of jack fruit rind powder was found to be causing a significant influence on sensory, physical, and chemical attributes. The fiber content of the biscuits gradually increased from T1 to T5 respectively. There was a significant difference in fiber content among the five treatments. The biscuit samples substituted with 5% of Jackfruit rind powder(T2) had the highest mean scores of overall acceptances. Increasing the percentage of jack fruit rind powder supplemented with wheat flour caused an elevated level of dark brownish color when compared to the control treatment.

Keywords: Jackfruit Rind Powder, Wheat flour

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Distribution of Sodium, Magnesium and Potassium in Paddy Growing Soils of Sri Lanka

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Abstract

Productivity of rice (*Oryza sativa* L.) is determined by the availability of plant nutrients. Plant nutrients are divided as major and trace elements. Potassium (K) sodium (Na) and magnesium (Mg) are three major elements required by rice, and their availability for rice in Sri Lankan paddy soils are largely unknown. Therefore, this study was conducted to study the concentrations of K, Na, and Mg and their correlations in soils collected from rice fields in Sri Lanka. Nine thousand soil samples were collected representing 25 districts by using a stratified random sampling approach. Samples were air dried and sieved using a 2 mm sieve. These elements were extracted in to 0.01 M $CaCl_2$ solution and detected using inductively coupled plasma-mass spectrometry (ICP-MS). Relationships between elements were determined using Pearson's linear correlation coefficient (*r*) and element concentrations among districts were compared using ANOVA The mean concentrations of K, Na and Mg were 56.0, 398.5 and 210.5 mg kg^{-1}, respectively. There were significant correlations among these elements; i.e. $r_{Na,Mg} = 0.40$, $r_{Na,K} = 0.27$ and $r_{K,Mg} = 0.40$ ($P<0.05$). There were also significant differences of Na, K and Mg concentrations between districts ($P<0.05$). Jaffna, Kilinochchi, and Mannar had higher Na concentrations (>375 mg kg^{-1}) than Badulla, Kegalle, and Nuwara Eliya ($P<0.05$). The highest Mg concentration was reported in Mannar (406 mg kg^{-1}) while Colombo, Galle and Kaluthara recorded lower values (<80 mg kg^{-1}). Higher K condncentrations recorded in Mannar, Jaffna, and Anuradhapura (>80 mg kg^{-1}), lower values recorded in Matale, Batticaloa, and Ampara (<35 mg kg^{-1}). Soil nutrient management practices need to be revisited in the paddy soil of Sri Lanka to achieve sustainable paddy cultivation.

Keywords: Magnesium, Potassium, Sodium, Paddy

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Assessment of Toxic Heavy Metal Concentrations of Paddy Soils in Sri Lanka

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Abstract

Rice is the staple food for Sri Lankans. In order to cater the growing demand, paddy cultivation has widespread in the country. Thus, application of fertilizers through external sources is always recommended to increase the productivity of rice. However, it is reported that the over application of synthetic fertilizers and other agro-chemicals with high impurities on rice paddy fields, leads to contamination of soils by toxic trace elements such as arsenic (As), cadmium (Cd) and lead (Pb). Therefore, the knowledge on the current level of accumulation of toxic heavy metals in soils is crucial for sustainable soil nutrient management and crop production. The aim of the study was to assess the concentrations of plant available/extractable toxic heavy metals and their relationships in Sri Lankan paddy soils. Nine thousand four hundred soil samples were collected representing 25 districts using stratified random sampling approach. Plant available toxic trace element concentrations were measured using Inductive couple plasma mass spectrophotometer (ICP-MS) after extraction in 0.01 M CaCl2 solution. The mean concentrations of As in soil was 24.6 µg kg-1 and ranging from 0 to 392 µg kg-1 which did not exceed the critical level of agricultural soil (>20,000 µg kg-1). Similarly, the mean concentration of Cd and Pb were 14.0 and 43.7 µg kg-1, and those were in the range between 0-163.4 and 0-1,433 µg kg-1, respectively. Thus, Cd and Pb concentrations in paddy soil did not exceed the critical levels which were 300 and 30,000 µg kg-1, respectively. Element concentrations were significantly different among districts ($P<0.05$). In general, element concentration in soil collected from Wet zone recorded relatively higher toxic trace element concentrations than those reported in Dry zone and Intermediate zone. There were significant correlations between As and Cd ($r=0.36$, $P<0.001$), As and Pb ($r=0.14$, $P<0.001$) and Cd and Pb ($r=0.16$, $P<0.001$). Regular monitoring of heavy metal concentrations in soils is necessary for area specific and appropriate soil management. This will lead to sustainable development in agriculture.

Keywords: Arsenic, Cadmium, Lead, Paddy

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Effect of Different Fruit Peels on The Growth and Yield of Lettuce

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Abstract

Fruit peels are rich in essential plant nutrients. Nowadays, the demand for organic fertilizer was increased. Therefore, the experiment was conducted to determine the effect of banana and citrus fruit peel-based nutrition sources on the growth and yield of lettuce. The experiment was arranged in a Completely Randomized Design with nine treatments and four replicates separately for powder and liquid form. In powder form, T1 (Control) – Only ½ recommended compost, T2 – ½ recommended compost + 2g of fruit peel powder, T3- ½ recommended compost + 4g of fruit peel powder, T4 – ½ recommended compost + 6g of fruit peel powder, T5 – ½ recommended compost + 8g of fruit peel powder, T6 – Only 2gof fruit peel powder, T7 – Only 4g of fruit peel powder, T8 – Only 6g of fruit peel powder, T9 – Only 8g of fruit peel powder. In liquid form, T1 (Control) – Only ½ recommended compost, T2 – ½ recommended compost + C1 concentration (1 cup fruit peels + 1000 mL water) , T3 – ½ recommend compost + C2 concentration (2 cups fruit peels + 1000 mL water) , T4 – ½ recommended compost + C3 concentration (3 cups fruit peels + 1000 mL water), T5 – ½ recommended compost + C4 concentration (4 cups fruit peels + 1000 mL water) , T6 – Only C1 concentration, T7 – Only C2 concentration, T8 – Only C3 concentration, T9 – Only C4 concentration. Quantitative parameters were measured. Data were analyzed by using Minitab software. In powder form, T3 was shown high fresh weight (205.703 ± 0.949) and a high number of leaves (20.667 ± 0.577) among all other treatments. In liquid form, T2 was provided with highfresh weight (261.33 ± 2.74) and a high number of leaves (20.667 ± 1.155) among other all treatments. Therefore, the present study paved a way for finding the best amount of fruit peel powder and the best concentration of fruit peel tea for lettuce.

Keywords: Banana peels, Citrus fruit peels, Fruit peel fertilizer, Fruit peel powder

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Effect of High-Density Planting on Timber Production and Structural Changes of Rubber Trees (*Hevea Brasiliensis* Muell.Arg.)

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Abstract

In order to meet the continuous increase in demand for latex, timber and fuel wood, the productivity of rubber plantations should be increased. Introducing high-yielding clones for improved latex and timber yield per tree and adjusting planting density can be considered to increase productivity in rubber plantations. Therefore, the present study aimed to assess different planting densities of two major rubber clones. This paper focuses on accessing rubber trees' timber production and structural changes at thirty years of age. The trees are at a fully mature stage and at the end of the economic lifespan, i.e. 30 years after planting. The experiment was set up in the Ratnapura district of Sri Lanka in 1992. Rubber was planted in four planting densities, i.e., 500, 600, 700 and 800 trees per hectare with two genotypes i.e., RRIC 100 and RRIC 121. Field layout was in split plot design where the planting density was the main plot whilst clone was the sub plot. Three trees in each sub plot were selected randomly and were used for the measurements of total timber volume, & merchantable volume per tree and per hectare, tree height (TH), canopy height (CH), canopy spread (CS) and wood density (WD) using the statistical package "Minitab" at 0.05 level of significant.. Total volume per tree and per hectare were significant higher in 600 among the planting densities tested based on 0.05 significant level. However, the merchantable volume per tree and per hectare were comparable among the four densities tested. Only the canopy spread was significantly higher in 600 planting densities tested based on 0.05 significant level.

Keywords: Planting density, Rubber clone, Timber, Wood

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Effect of Maturity and Stem Girth of Super Napier Grass Cuttings on Selected Initial Growth Parameters

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Abstract

The Super Napier Grass (SNG) is a hybrid grass produced by crossing Ordinary Napier grass (*Pennisetum purpureum*) and Pearl Millet (*Pennisetum purpureum*).Stem cuttings and root slips can be used in the vegetative propagation of SNG. The study aimed at how maturity and stem girth of cuttings affect the selected initial growth parameters of SNG. Double node cuttings (n=400) at the length of 15 cm were taken and categorized according to the maturity level and size of the cutting as medium semi-hardwood (MS), large semi-hardwood (LS), medium hardwood (MH), and large hardwood (LH). The cuttings were assigned as a completely randomized design and 20 cuttings from each treatment were evaluated in the 1st week and 2nd week of its initial growth. During the 1st week, root length (RL), roots per node (RPN), and the number of active buds (AB) were recorded. The leaf length (LL), active nodes (AN), number of tillers (TL), and leaf width (LW) were recorded in 2nd week. Data were analyzed using SPSS (25). The results revealed that there were no significant differences between treatments for ($p > 0.05$) RL, RPN, and AB in the 1st week. A significant difference ($p < 0.05$) was recorded in LL, AN, and TL during the 2nd week. A maximum LL (44.35 ± 1.15 cm) was recorded in LS while a minimum (25.8 ± 1.15 cm) was recorded in MH. A maximum AN (1.9 ± 0.08 cm) was recorded in LH and a minimum (1.0 ± 0.08 cm) was recorded in LS. The maximum (2.1 ± 0.15 cm) and minimum (1.3 ± 0.15 cm) TL were recorded in LH and MH respectively. The results revealed LS and LH cuttings can properly be used for the propagation of SNG, and hence, careful selection of healthy cuttings and manipulation of growing conditions are required to get optimum plant growth.

Keywords: Super Napier, Stem cuttings, Leaf length, Root length, Active buds

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Effect of Xanthan gum and Homogenization on the Stability of Palmyrah (*Borassus Flabellifer* L) Ready to Serve Drink

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Abstract

Palmyrah (*Borassus flabellifer* L) fruit pulp is widely utilized in the production of many value - added products. The problem identified in the production of Palmyrah ready-to-serve drink (RTS) is layer separation and sedimentation during storage. Hence this study was conducted with the intention of producing a customer appealing product with the optimization of stabilizer (xanthan gum) and homogenization process. The concentration of xanthan gum (0.1%, 0.2%, and 0.3%) and application of homogenization (homogenization at 10,000rpm for 3 minutes, without homogenization) were selected as the two factors in the experimental design. The effect of different treatments on the physical properties (sedimentation height, turbidity, viscosity and color) of the RTS was studied with the storage period. The best treatment was selected based on the sensory evaluation. According to the experimental results, sedimentation was not observed during the storage period of 30 days for the homogenized and non-homogenized RTS with xanthan gum (0.3%). Increasing concentration of xanthan gum and the application of homogenization significantly ($p<0.05$) increased the viscosity (3.55-124.30mm^2/s) and turbidity (37.25-778.65NTU) of RTS. Applying xanthan gum decreased the L* value, and slightly increasing the a* value and drastically increasing the b* value. Hence, it can be suggested that adding of xanthan gum helps to maintain the homogeneity and stability of the carotenoid compounds in the RTS. Homogenized RTS with the inclusion of 0.3% xanthan gum was selected with overall acceptability based on the sensory evaluation. In conclusion, the application of xanthan gum and the homogenization process improved the stability of RTS.

Keywords: Homogenization, Palmyrah, Ready to serve drink, Stabilizers, Xanthan gum

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Investigation of Common Soil-Borne Pathogens Associated with Locally Produced Compost

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Abstract

Compost contains plant or animal-based materials that are either a by-product or end product of naturally occurring processes such as microbial degradation. Some microorganisms are beneficial for agriculture while some are pathogenic. This study was conducted to investigate the selected common soil-borne pathogenic bacteria (soft-rot *Erwinia* spp. and black-rot *Xanthomonas* spp.), fungi (*Fusarium* spp. causes for head blight, root rot and seedling blight for cereals, panama disease for banana and infect for human nail, cornea and damage whole immune system and *Rhizoctonia* spp. causes for collar-rot, root-rot, damping off and wire stem diseases) and oomycetes (*Pythium* spp. causes for root rot and damping off and *Phytophthora* spp. cause for root-rot disease) to ensure the quality of locally produced compost prior to use in cultivation. Random samples drawn from 20 stocks of composts produced island-wide were tested. Fungi and oomycetes were identified by colony morphology on synthetic culture media and microscopic observation. The bacteria were identified by adopting culture-based methods and biochemical characterization. Biochemical tests namely 3% KOH test, growth at 37℃, starch hydrolysis, casine hydrolysis, oxidase reduction test, catalase test, erythromycin test and urease test were performed. In addition, pathogenicity of bacteria was verified using carrot and dieffenbachia slices. The results revealed that out of 20 samples, nine samples were contaminated with *Pythium* spp., *Fusarium solani,* and *Rhizoctonia* spp. while three samples were contaminated with *Erwinia chrysanthemi*. It was concluded that 50% of locally produced composts were contaminated with investigated soil-borne pathogenic microorganisms. As that there is possibility of spreading soil-borne pathogens via composts. Therefore, the standards should be developed in the future for compost to mitigate the spread of soil-borne diseases to enhance crop production.

Keywords: Bacteria, Compost, Fungi, Soil-borne microorganisms

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Fire effects on Persistence of Soil Water Repellency in Eucalyptus Grown Soils in Upcountry Sri Lanka

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Abstract

Soil Water Repellency (SWR) is a well-known character, which retards spontaneous penetration of water into soil matrix. It can enhance environmental risks on natural habitats and agricultural lands. There are many factors that affect SWR. Temperature, or the heat, is one of those factors that is identified to as enhancing or destroying SWR. Fire-induced SWR causes detrimental effects on forest ecosystems around the world and its importance is reported in past few decades. Wildfires are not usually observed in Sri Lanka. Still, anthropogenic forest fires are common in up country plantation forests. This study examines the effects of different temperature treatments range from 50°C to 250°C with different exposure times on the persistency of water repellency in soils from different depths of the profile under laboratory conditions. Samples were collected from 0–5, 5–10 and 10–15 cm depths of a water-repellent Eucalyptus forest in Diyathalawa. Samples were subjected to heating at six temperature levels (50, 70, 100, 150, 200, 250 °C) for five durations (20, 40, 60, 90 and 120 min). The changes in SWR were measured using water drop penetration time (WDPT) test. Soil water repellency has increased from 50°C to100°C, but exhibited decreasing trend after 150°C. Further, SWR showed decreasing trend with increasing exposure time period. The possible reason could be the removal of water repellent organic compounds in the soil. However, heat treatment at 250°C exhibited remarkable increment of SWR in 20 and 40 min time periods. This may probably due to formation of pyrolyzed compounds in the soil at very high temperatures. We observed some soil erosion evidences in the areas where slope percentage is greater than 65. Hence, there is a risk of fire induced SWR leading to increased rate of soil erosion in Eucalyptus grown forests in upcountry especially during rainy season.

Keywords: Eucalyptus, Soil water repellency, Fire effect, Water drop penetration time

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Investigating the Levels of Aflatoxins and Physichemical Properties of Whole Kernel Virgin Coconut Oil of a Selected Factory

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Abstract

Whole kernel virgin coconut oil (WKVCO) is made from the fresh mature coconut kernel inclusive of testa by mechanical process, with or without use of heat not exceeding 60°C. Aflatoxin are toxic secondary metabolites of several species of fungi. Free fatty acid level (FFA), iodine value (IV), saponification number (SAP), and level of insoluble impurities of coconut oil. This study was carried out to investigate whether the WKVCO produced by the selected factory comply with the standard specifications. Samples were collected from 5 and10 batches of the selected mill in Mullaitivu district and they were analyzed for aflatoxin levels and physiochemical properties respectively. Aflatoxins were analyzed by Enzyme–Linked immunosorbent Assay- and by using High Performance Liquid Chromatography - technique. Physiochemical properties of the samples were determined by SLS 313 of SLS 32:2017 methods. Data were subjected to ANOVA and mean separation by Tukey pairwise comparison using MINITAB 17 statistical software. Aflatoxins were not detected in any of the batches taken from the selected mill. Physicochemical properties of the samples; FFA value ranged 0.13±0.00 - 0.38 ± 0.01%, IV ranged from 4.00 ± 0.07 - 5.46 ± 0.01 g/100g, SAP value ranged from 247.11 ± 1.92 - 264.13 ± 0.92 mg KOH/g and insoluble impurities ranged from 0.03 ± 0.01- 0.07 ± 0.00 %. Iodine value of all samples were within limits (4.1 – 7.5 g/100g) stipulated by the SLS (SLS 32:2017). However, with respect to the SAP value, 50% of the samples complied with the SLS standard (255 - 265 mg KOH/g). In regards to the FFA value, 60% of the samples complied with the SLS standard (0.2% max) whereas in respect of insoluble impurity level, 70% of the samples complied with SLS standard (0.05% max). The result implied that in general, the quality of coconut oils in terms of the parameters considered fell short of SLS standards. Therefore, further improved processes are required to maintain the quality of WKVCO. Further studies with other mills will generate substantial information about the quality of WKVCO produced in Sri Lanka.

Keywords: Whole kernel virgin coconut oil, Aflatoxin, Free fatty acid, Iodine value, insoluble impurities, Saponification number

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Development and Quality Evaluation of Oyster Mushroom (*Pleurotus Ostreatus*) Flour Base Noodles Product

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Abstract

Mushrooms are essential food in human nutrition but they cannot be stored for a long time due to their short shelf-life and high perishability. Noodles are the most popular food item among all age groups, with a long shelf life and high commercial value. Therefore, this study was conducted to compare the nutritive value of oyster mushroom flour base noodles with that of the control noodles sample. Oyster mushroom was selected as the mushroom variety. Because oyster mushroom is the mostly consumed mushroom variety in the world. Five treatments were developed based on the various combination of mushroom flour (mushroom flour of T1-0%, T2-10%, T3-20%, T4-30%, T5-50%) with 100% wheat flour as a control treatment, to prepare the noodles. Physico-chemical analysis, such as moisture content, protein content, fat content, ash content, and pH was conducted using the AOAC method. Sensory evaluation was conducted to evaluate the organoleptic properties of the noodles (appearance, color, taste, texture, aroma, and overall acceptability), which were analyzed on a 9-point hedonic scale. The pH of noodles in all treatments ranged from 6.50 to 6.66, which is neutral. T5 noodles sample (mushroom: wheat = 50:50) had the highest nutrient level in Protein (14.83 ± 0.01^{a}), Fat (4.77 ± 0.01^{a}) and Ash (2.58 ± 0.02^{a}) compared to other treatments and showed it showed significant variation at 5% level. In the sensory evaluation, the T2 treatment (mushroom: wheat = 10:90) has the highest value for its appearance, color, texture, taste, aroma, and overall acceptance. T2 noodles also showed a reasonable higher value in protein (13.38 ± 0.02^{c}) and fat (3.10 ± 0.03^{c}) contents, and less ash (0.76 ± 0.01^{c}) content when comparing the other treatments. By considering the organoleptic properties obtained in the sensory evaluation, the T2 noodles sample can be recommended for a commercial.

Keywords: Mushroom, Noodles, Protein, Fat, Oyster

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Effect of King Coconut Husk Biochar on Nitrogen Retention in Sandy and Clay Soils Fertilized with Urea and Ammonium Sulphate

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Abstract

Discarding large volumes of king coconut husks (KCH) is a major issue in the coconut water export sector. Even roadside sellers discard large amounts and there is no proper way to dispose them. Since king coconut is harvested at an early stage, the husk has no economic value due to less amount of fiber. KCH can be utilized in a sustainable manner by converting it into biochar and applying as a soil amendment. Biochar has a potential to minimize nitrogen (N) losses through leaching. A laboratory leaching column study was conducted to determine the impact of KCH biochar on N retention in sandy and clay soils when applied in the form of urea and ammonium sulphate (AS): application rate is 0.06 and 0.07 g cm^{-2} or 6 and 7 t ha^{-1}, respectively. KCH biochar was prepared at 500 °C in a muffle furnace and amended topsoil of the columns at 0, 1, 2, and 3% (w/w) rates. KCH had 84% fixed C, 8% ash, 7% volatile matter, and 1% moisture content. Over a two-months period, soil columns were leached with 200 mL of distilled water once a week, and the total N content of the leachates was analyzed. When AS was added to sandy and clay soils it depicted 49 - 62% N leached whereas urea, 34-49 % N leached in sandy and clay soils. This indicates that biochar application to sandy soils has a stronger effect on reducing leaching losses than in clay soils and soils with urea application showed lesser N leaching compared to AS. 2% biochar application rate with urea showed 34 - 42% N leaching in sandy and clay soil whereas 3% application rate showed 32 -58% N leaching in sandy soil and clay soil. Interestingly 2 and 3% application rates resulted the least amount of N drainage without a significant difference ($P > 0.05$) compared to the other two tested rates. In order to reduce N leaching in sandy soil, 2% KCH biochar with urea can be recommended as a soil amendment for field application.

Keywords*:* Urea, Ammonium sulphate, Leaching column study, N retention

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Bio Efficacy of Different Non-Hazardous Alternative Chemicals and Commercial Fungicides for Controlling Groundnut Stem Rot by *Sclerotium rolfsii*. S

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Abstract

In Sri Lanka groundnut (*Arachis hypogaea* L) is grown mainly for edible purposes and it's mostly affected by stem rot disease that is caused by the necrotrophic soil-borne plant pathogen *Sclerotium rolfsii*. To control stem rot disease, farmers generally use commercial fungicides that lead to developing resistance forms of *S. rolfsii*. The present study was conducted to identify environmentally sound nonhazardous alternative chemical products to control *S. rolfsii*. Two non-hazardous alternative chemicals (Na_2CO_3 (T6) and $NaHCO_3$ (T7)) are investigated with five commercially available fungicides (Captan (T2), Carbendazim (T3), Mancozeb (T4), Chlorothalonil (T5), and Sulfur (T8)) with different concentrations under *In-vivo* and *In-vitro* conditions. The field experiment was laid out in a Randomized Complete Block Design on eight treatments with three replicates for two different concentrations (500ppm and 1000 ppm). The *In-vitro* experiment was laid out in Complete Randomized Design on eight treatments with five replicates for two different concentrations (500ppm and 1000 ppm). In the *In-vitro* conditions, the mycelial growth inhabitation rate was measured. From the mycelial growth inhibition, T6 (Na_2CO_3) and T7 ($NaHCO_3$) successfully inhibited mycelial growth like commercially available fungicides at 1000 ppm (T6-100% and T7-100%). In 500ppm concentration, the complete inhibition rate (no mycelial growth) was observed in T6 (Na_2CO_3). In *In-vivo*, the disease incidence was recorded. From that results, there is no significant difference between commercial fungicides and non-hazardous alternative chemicals (Na_2CO_3 and $NaHCO_3$) in both concentrations (500 ppm and 1000 ppm). Therefore the non-hazardous alternative chemicals (sodium carbonate and sodium bicarbonate) were equal and superior to the other fungicides for control of *S.rolfsii* on groundnut in 500ppm and 1000ppm concentrations.

Keywords: Groundnut stem rot, *Sclerotium rolfsii*.S, Sodium carbonate and bicarbonate

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Characterization of Morphological, Physiological and Yield Parameters in Six Different Accessions of *Lablab purpureus* (L.) in Sri Lanka

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Abstract

In many developing nations, nitrogen-fixing grain legumes are valued as an essential source of protein due to their cheap availability and easy affordability. Although Lablab bean (*Lablab purpures*) is a lesser-known legume with comparable nutritional properties to soybean, it has been grown and utilized as a vegetable in Sri Lankan backyard gardens for a long time. However, there is a lack of information regarding the morphological, physiological, and yield parameters of different accessions of Lablab bean. Therefore, this study was carried out at the Peradeniya University Experimental Station, Dodangolla with the aim of exploring the morphological, physiological, and yield attributes of six different lablab accessions: 12143, 12146, 12148, 12161, 12162, and 12163 under field conditions. The treatments were laid according to Randomized Completed Block Design (RCBD) with three replicates per treatment. Data analysis was performed in SPSS v25 with post hoc test (Tukey's pair-wise) to compare mean differences among the treatments. Results revealed non-significant ($P>0.05$) differences across all accessions related to vine length (370–400 cm), shoot counts (6-7 per plant), days taken for 50% flowering (49 – 56), and rate of leaf net photosynthesis (16–19 μmol CO_2 m^{-2} s^{-1}). However, significant ($P<0.05$) variations were observed among different accessions related to the production of inflorescence per plant, average length of a pod (5.6±0.24 - 12.0±0.32 cm), average fresh weight of 10 pods (24.0±0.0 - 74.0±1.2 g), and average weight of 10 seeds/pod (5.3±0.3 - 13.3±0.7 g). Considering average no of pods/plant, average length of a pod (9.6±0.40 - 10.6±0.40 cm), average weight of 10 seeds/pod (9.3±0.3 - 10.0±0.6 g), and average fresh weight of 10 pods (62.7±1.2 - 66.3±1.20 g), accessions 12161 and 12162 can be selected as the elite germplasm for cultivation. Testing for nutritional composition, anti-nutrient factors and potential processing methods to reduce anti nutritional factors (if available) is recommended for future studies to make Lablab bean popular among consumers.

Keywords: Accessions, Growth, Lablab, Legume, Yield

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Development of Coconut (*Cocos nucifera*) Kernel-Based Curry Mixture

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Abstract

There is increasing demand for instant spice mixtures because of their convenience to use. However, a product combining spices and coconut is not currently available in the market. Therefore, this study was conducted to develop a coconut kernel-based curry mixture. Three types of coconut kernel pulp were prepared by following three different methods; (a) by grinding fresh coconut kernel, (b) by roasting coconut kernel after grinding and (c) by grinding coconut kernel after roasting. Using these three types of coconut kernel pulp, three curry mixtures were prepared keeping quantities of powdered spices (shallot, coriander, chili, cumin, turmeric, cardamom, cinnamon, clove, garlic ginger, mustard and mustard), sugar, salt and oil constant. Baby jack fruit curries were cooked using three curry mixtures and their sensory properties; appearance, taste, texture, color, order and overall acceptability were evaluated by 30 untrained panelists using 7-point hedonic scale. The selected curry mixture was evaluated for proximate composition. Aerobic plate count, yeast and mold count and free fatty acid content of the selected curry mixture were investigated weekly for a period of 3 weeks. Sensory data were statistically analyzed by Friedman non parametric test using Minitab 17. Baby jack fruit curry cooked with the curry mixture prepared using coconut kernel ground after roasting, received the highest sums of ranks for all sensory parameters evaluated. Moisture, crude fat, crude protein, and crude fiber contents (%) of the selected curry mixture were 4.16±0.00, 26.30±0.64, 10.59±0.06, and 11.48 ±0.97 respectively. After 3 weeks of storage period, aerobic plate count (CFU/g) of the selected curry mixture was 8.2 ×104 and its yeast and mold count (CFU/g) and coliform count (MPN/ml) remained less than 10. After 7 days of storage, its free fatty acids level (0.99 mg of NaOH/g) exceeded the maximum level (0.8 mg of NaOH/g) stipulated for coconut oil by the SLSI. Therefore, it is necessary to use preservatives and proper packaging to enhance the shelf life of the product. It can be concluded that instant curry mixture with good sensory acceptance can be prepared by incorporating spices to coconut kernel pulp prepared by grinding after roasting.

Keywords: Roasted coconut Kernel, Curry Mixture, Spices Mixture

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Changes in Consumer Food Consumption Behaviour during Covid-19 Pandemic in Mannar District, Sri Lanka

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Abstract

Food supply chains and food security has been negatively impacted due to the Covid-19 pandemic changing food consumption behaviour around the globe. The study was conducted to identify changes in food consumption behaviour during the Covid-19 pandemic in Mannar district, Sri Lanka. A cross-sectional survey was conducted using 206 individuals using a structured questionnaire. Results reveal that consumers have brought food more than usual (81%), gone to food stores less often (48%) and stockpiled food (39%). Consumers have mainly increased the quantity purchased in fruits and vegetables, healthy foods, cereals & legumes, and water to ensure food availability. Considering the diet changes, around 15% claimed they ate a more nutritious diet while many (52%) claimed they ate almost the same diet. Food acquisition methods have also changed due to the pandemic; most food items were purchased from retail shops, while purchasing from delivery vehicles increased during the pandemic. Consumers stockpiled essential food items like cereals & legumes, fruits & vegetables and sugar to avoid shortage and as a measure of rising food prices. It can be concluded that consumer food consumption behaviour has changed in terms of the quantity purchased, food acquisition method, and food stockpiling due to Covid 19 pandemic among the investigated consumers. Surveying with increased consumer participation and investigating further details on food consumption, like money spent and promotional sources used, can help better understand how food consumer behavior changed due to the COVID-19 pandemic in the area.

Keywords: Food acquisition method, Stock piling of food, Quantity purchased

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Geographical Distribution and Morphological Characterization of Tropical Almond (*Terminalia catappa* L.) in Hambantota District, Sri Lanka

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Abstract

Terminalia catappa L. is a multipurpose tree grown in natural regeneration or occasionally as a planted crop and remained as underutilized in Sri Lanka. There is lack of studies on the distribution and morphology of tropical almond plants. Hence, this research aimed to study the variations in morphological traits of *T. catappa* plants found in different locations in Hambantota district. The six divisional secretariats (DS) divisions were randomly selected and five grama niladhari (GN) divisions were randomly selected from each DS division. The snowball sampling technique was used to select the sample from GN divisions. Quantitative and qualitative characterization was done using visual observation and numerical measurements based on the plant descriptors developed for the study from mature 65 trees (more than three years). According to results, tropical almond plants were varied height from 7-40 m with gray or brownbark. The diameter at the breast height was varied from 10- 70 cm. The leaves are obovate and leaf length varied from 13-43 cm and 9-20 cm. The inflorescence length varied from 6-20 cm with flowers 0.5- 1.2 cm in length and 0.3- 0.6 cm in width. The fruit varied in length from 3- 7 cm and in width from 3- 5 cm. The ripe fruit weight varied from 15-35.0 g. According to the dendrogram generated using the cluster analysis based on quantitative characters, at the 55.55% similarity level three main clusters were separated. Accession from near geographical locations was grouped into the same cluster. Thus, plants from near location have similarities in morphological characteristics due to their natural regeneration nature except planting of tropical almond plants.

Keywords: Morphological Characterization, *Terminalia catappa*

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Variation of Banana Fiber Yield under Different Agro-climatic Zones of Sri Lanka

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Abstract

Pseudostem is the major waste biomass being generated and not utilized after the harvesting of banana. Fibers can be extracted from these pseudostems by different procedures including chemical, mechanical, biological, and combined treatments. An agro-climatic zone is a region separated based on several factors that influence on crop yield. Fibers were extracted by a decorticator machine from banana pseudostems of Seeni (ABB), Embul (AAB) and Cavendish (AAA) cultivars at harvesting stage, representing Dry Zone, Wet Zone and Intermediate Zone of Sri Lanka to investigate the effect of agro-climatic zone on fiber yield separately. Three representative samples weighing 1 kg of the pseudostem sheaths in each variety were used for fiber extraction and measurements. During fiber extraction, pseudostem sheaths of banana were cut into pieces of 1 m in length and fed to the decorticator. After extraction, the fibers were hung up to air dry and the dry weight was measured. The fiber yield of banana was significantly ($p<0.05$) influenced by the agro-climatic zone for the variety Embul but no difference in variety Seeni and Cavendish. Embul variety recorded the highest fiber yield percentage of 3.15 g of dry fiber per 100 g of fresh pseudostem sheaths in the Intermediate Zone. Further, on average, Seeni variety reported the lowest average fiber yield from all agro-climatic areas followed by Cavendish. This study will provide a better comparison of fiber yield of different banana cultivars under different climatic zones of Sri Lanka.

Keywords: Cavendish, Decorticator, Embul, Pseudo stems

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Farmer issues on *Solanum virginianum* (Katuwelbatu) Cultivation

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Abstract

Solanum virginianum (Katuwelbatu) is a medicinal plant belongs to Solanaceae family, and the plants prefer dry weather conditions. It is distributed as a commercial cultivation mainly on North-western province, Sri Lanka. The plant is having medicinal value as an herbal product. Sri Lankan farmers are facing several concerns growing *Solanum virginianum*. Understanding of these issues is important to enhance the crop sustainability. Thus, the Anamaduwa Divisional Secretariats division in North-western province, Sri Lanka has been selected for the study, with a sample size of seventy *Solanum virginianum* growing farmers. The stratified random sampling procedure was utilized, and all respondents in the sample were asked to complete a standardized survey questionnaire that had been pre-tested. Using a five-point Likert scale ranging from strongly disagree to strongly agree, qualitative data were collected. Results indicated that most farmers are men aged 41 to 50 with an O/L level of education. Moreover, the majority are married. As consequences for cultivation, lack of irrigation facilities, knowledge, technical services, and planting materials were strongly disapproved by the farmers. In addition, absence of required labour and fertilizer also a vital issue. However, pest and disease were considerably neutral in the cultivation. To ensure the long-term viability of the sector, it is vital to overcome the existing drawbacks of *Solanum virginianum* farming.

Keywords: Cultivation, Farmers, Issues, Medicinal plants, Solanum virginianum

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Comparison of Seed Morphology among Sri Lankan Wild Rice Species

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Abstract

The genus *Oryza* is one of the most important plant groups in the family *poaceae*, which includes 24 species and is distributed in the tropics and subtropics of the world. The future breakthrough of rice breeding relies greatly on the exploration and utilization of rich germplasm in the rice gene pool, particularly the wild relatives of rice. The diversity of agronomical characteristics of wild rice (*Oryza*) plays a vital role in rice breeding programs worldwide. The seed characteristics are of particularly interest amongst them. The study assessed the variations in seed morphological traits of wild rice species in Sri Lanka; *O. nivara*, *O. rufipogon*, *O. eichingeri*, *O. rhizomatis*, and *O. granulata*, which could be useful in rice breeding. The common garden experiment conducted as a pot experiment in a completely randomized design, with ten pots (replicates) for each wild rice species. ANOVA revealed that the quantitative traits, such as the 100-grain weight (g), grain length (mm), and grain width (mm), are distinctive among the five species and are promising characters in field identification and breeding. Among the species, *O. nivara* showed the highest 100-grain weight ($p < 0.0001$) and grain width (2.625 mm), indicating that this species is closer to the cultivated species and that such desirable traits are effective in rice breeding. Both *O. nivara* and *O. rufipogon* showed a more considerable grain length when compared to the rest. Thus, our study provides a clear picture of wild rice seed traits to be effectively used in field identification and future utilization of wild relatives related to seed trait-oriented studies. Overall, these five species are distinct in seed morphological traits and panicle type. *O. granulata* and *O. nivara* have compact panicles, *O. rufipogon* has an open panicle, and *O. eichingeri* and *O. rhizomatis* have intermediate-type panicles. The grains of these five species exhibited a wide array of sizes and shapes but still fell within the standard classification scale rice breeders use for routine breeding evaluation. These results highlight the potential of these species as whole grain foods or as sources of novel alleles in conventional rice breeding programs.

Keywords: Wild rice, Diversity, Seed morphology, Sri Lanka

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Identifying Suitable Preservation Technique for King Coconut Water *(Cocos Nucifera Var. Aurantiaca)* Using Naturally Available Ingredients and its Quality Assessment

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Abstract

There's an increasing demand for natural beverages for its preserved natural properties. King coconut (KC) is one of the widely acceptable natural refreshing beverages. It's no longer usable when exposed to the environment, as its gradual decomposition of natural characteristics. There is an opportunity for developing a ready to serve drink (RTS) from KC, this study was conducted to develop it by adding naturally available additives. Sterilized conditions were used for experimental procedures. KC water, an age of 8-9 months, was collected. Their Brix˚ value was standardized to 9˚, using white sugar. KC water of 100 ml was treated with 0.02 mL of lime juice and 0.08 g of clove separately and as a combination. They were either subjected or not to pasteurization (72 ºC for 2.5 minutes). Based on the combinations of KC water, lime juice, clove and pasteurization, 12 types of combination of treatments were set up. All types were kept at 4°C for four days. Total soluble solids (TSS/Brix˚), pH and titratable acidity were measured before and after storing. Microbiological tests were also conducted. Sensory analysis was conducted through untrained panelists to find consumers' preference of and overall acceptability. Fresh KC water was treated as the control experiment. During the storage period, significant difference was observed (at p=0.05) in TSS, pH, and titratable acidity between all treated samples. Moisture level wasn't changed in any treatment. Although, pasteurization is good for extending shelf-life, there's a negative impact on sensory characteristics. However, both treated with lime and pasteurized samples had a cloudy appearance due to fermentation. There wasn't microbial count observed in any treatment. Pasteurized KC water with additives is safe to consume whereas, it acquired the least acceptability for its sensory attributes. The minimum level of acceptance for the odour and taste may be due to the astringent flavor created by clove. Although it obtained the least preference for the said sensory attributes, it exhibits the same level of preference with the commercially available soft drink and is microbiologically safe to use.

Key words: RTS drink, King coconut water, Beverage

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Effect of Photoperiod on selected Agronomic and Yield Characters of Three Sri Lankan Traditional Rice Accessions

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Abstract

Rice (*Oryza sativa* L.) is one of the most important cereal crops, which provides the staple food for half the world's population. Rice production is affected by environmental factors to a greater extent. The objective of this experiment was to determine the effect of photoperiod on selected agronomic and yield characters of selected three rice accessions. Three traditional rice accessions (5530 of *Masuran*, 6412 of *Herath*, and 4237 of *Ma wee*) were exposed to three photoperiod regimes (11.75, 12.00, and 12.08 hours respectively) in a greenhouse. A control treatment was maintained as exposure to the natural day length of the growing period which ranged from 12.03 to 12.15 hours. The experiment was laid in a completely randomized design with three replicates. Based on descriptors for rice, data were collected on days to flowering (DF), plant height at flowering, and the number of spikelets per the first panicle. There was a significant variation in plant height at the flowering stage among treatments ($P<0.05$). The interaction effect of accession and photoperiod on plant height at the flowering stage was significant ($P<0.05$). Selected three accessions observed significant differences in DF with respect to photoperiod ($P<0.05$). Accession 4237 reported highest DF (205±0.89) under 12 hours while the lowest DF was observed from accession 6412 under 11.75 hours. DF of accession 6412 had reduced significantly to 11.75 hours of photoperiod compared to the control plants ($P<0.05$). The highest number of spikelets per first panicle (215±0.36) was observed in accession 5530 (Masuran) under 11.75 hours of photoperiod. The lowest number of spikelets per first panicle (93±0.66) was observed in accession 6412 in the control. The accessions 6412, 5530, and 4237 show the highest number of spikelets per first panicle at 11.75 hours of photoperiod when compared to the control. The interaction effect of accession and photoperiod on the number of spikelets per the first panicle was significant ($P<0.05$). The above results indicate the responsiveness of representative rice accessions to photoperiod for agronomic characters, which would be useful in future breeding program.

Keywords: Photoperiod, Traditional Rice, Flowering time

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Determination of the Phytochemicals in Kappetiya (*Croton laccifer*) Leaves & Comparison of the Two Different Extraction Methods to Extract Kappetiya (*Croton laccifer*) Leaves: Hydrodistillation and Soxhlet Extraction

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Abstract

The traditional applications of Kappetiya (*Croton laccifer*) has increased drastically over the past decades in some fields such as fruit ripening and pest control. Kappettiya (*Croton laccifer*) is a common plant species found in deserted lands of Sri Lanka. In this study, two different extraction techniques: hydro distillation (HD) and soxhlet extraction (SE), were used to extract Kappetiya (*Croton laccifer*) dried powdered leaves and compared for extraction yield of the extracts and phytochemicals of the extracted crude was determined. The highest yield can be extracted using soxhlet extraction over hydro distillation method. The yields obtained using soxhlet extraction were found to be 278.70 g/kg, 267.93 g/kg and 261.96 g/kg. The yields obtained using hydro distillation were found to be 5.99 g/kg, 4.50 g/kg and 3.00 g/kg. The extracts were analyzed using Fourier Transform Infrared (FTIR) spectroscopy. The results of FTIR analysis of the crude extract obtained using soxhlet extraction showed that Alcohol (O-H) was resulted at the wave number 3268.96 cm-1, Conjugated alkene or cyclic alkene (C=C) was resulted at the wave number 1602.34 cm-1, primary alcohol (C-O) or (C-N bending) was obtained at the wave number 1397.11 cm-1 and 1319.89 cm-1, alkyl halides (C-X) was obtained at the wave number 581.86 cm-1 and 529.18 cm-1. Soxhlet extraction is chosen as the suitable method to extract Kappetiya (*Croton laccifer*) phytochemicals due to its advantages such as improving analyte displacement from the matrix because the sample phase is repeatedly in touch with new solvent, and eliminating the requirement to filter the extracts, requires a smaller quantity of plant material and it gives high amount of yield over the hydro distillation method. The comparison is based on the polar phytochemicals (from soxhlet extraction) and non-polar phytochemicals (from hydro distillation) yield in Kappetiya (*Croton laccifer*) leaves. The results show that polar phytochemical yield is higher than the non- polar phytochemical yield.

Keywords: Hydro distillation, Phytochemicals, Soxhlet extraction

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*

Effect of Integrated Use of Wedelia Trilobata Plant Extract with Commercial Fungicides for the Management of Black Rot Disease in Tea

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Abstract

The black rot disease (causal fungus; *Cortcium theae* and *Cortcium invisium*) of tea (*Camellia sinensis)* is one of the foliar diseases in Sri Lanka. It is a serious concern for thetea industry due to the reduced tea yield and quality. Recently, synthetic fungicides have been used to control black rot disease, but they are more toxic substances and pollute the environment. Therefore, the present study was performed to identify the effective integratedmethod by using botanical extract of *Wedelia trilobata* (common name: Tharuka and Arunadevi) and Captan to control disease while reducing chemical fungicide. The Black Rot pathogen was isolated on Potato Dextrose Agar from symptomatic mature tea leaves and identified the pathogenicity of the isolate using a detachment assay. Molecular analysis confirmed the isolated pathogen as *Daldinia eschscholtzii*. Phytochemicals from the stems,leaves, and flowers of *Wedelia trilobata* were extracted with ethyl acetate and soxhlet extraction. *In vitro*, antifungal assays were conducted using the poison food technique withtreatment of 4000 ppm, 12000 ppm, and 24000 ppm of each of the stem, leaves, and flowerextracts; 200 ppm, 600 ppm, and 1200 ppm of Captan. The Dunnet test showed that 4000 ppm, 12000 ppm, and 24000 ppm of stem and flower extract, and 24000 ppm of leaves extracts, and 200 ppm, 600 ppm, and 1200 ppm of Captan were significantly different. Stemextract showed minimum growth of the mycelium of the pathogen. At low concentration, 4000 ppm of stem extract and 200 ppm of Captan were incorporated with three different volume ratios, namely; 1:1, 1:2, and 2:1, 4000 ppm of stem and 200 ppm of Captan, respectively, and an antifungal assay was performed for each of the treatments. According to that, an incorporated 2:1 ratio of stem and Captan could mitigate 100 % mycelium growthof a pathogen.

Keywords: Black rot, *Camellia sinensis*, Poison food method, *Wedelia trilobata*

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Soil Application of Chitosan on the Yield and Yield Components of Thilina Tomato (*Solanum lycopersicum* L.)

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Abstract

Chitosan plays an important role as a crop biostimulant for sustainable agriculture. A pot experiment was conducted at premises of Uva Wellassa University of Sri Lanka during the*Yala* season to determine the effect of soil application of chitosan in four different concentrations on yield and yield components of the tomato. Certified seeds of cultivar *Thilina* were sown in a nursery tray and seedlings were raised for three weeks. The healthyseedlings were transferred to the polyethylene bag filled with a potting mixture of red soil and compost in the ratio of 1:2. A total number of 128 bags were used for this research work. An experiment was designed in Randomized Complete Block Design (RCBD) withfour replications. Concentrations of 70, 80,120 ppm and control treatments were applied tothe soil during the vegetative, flowering and ripening stage of the plants to determine the fruit number, single fruit weight, fruit diameter and yield. There was significant ($P < 0.05$)variation in yield and yield components due the different level of the soil application of thechitosan. Among the treatments, a higher number of fruits per plant (39), single fruit weight(90 g), fruit diameter (4 cm) and yield (69 t ha^{-1}) were obtained from the rate of 120 ppm concentration. In contrast, the lower number of fruit (21), single fruit weight (60 g), fruit diameter (3.2 cm) and yield (31.7 t ha^{-1}) were recorded in the control treatment. Inconclusion, chitosan at the application rate of 120 ppm could be used to enhance tomato yield and yield components.

Keywords: Bio stimulant, Chitosan, Soil application, Tomato, Yield components

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Validation and Quantification of Commonly Used Sweeteners and Preservatives in Ready-to-Serve Beverages Available in Sri Lanka

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Abstract

Diabetes patients and obese people need to drastically reduce their sugar on their sugar intake. Frequently, non-nutritious sweeteners take the place of sugar in beverages. Preservatives are also frequently added. As the concentration of additives in beverages is determined by the legislation in force, it is necessary to have an appropriate analytical method for food quality control. This research study was carried out to validate a High Performance Liquid Chromatography (HPLC) method for simultaneous quantification of Acesulfame – K, Aspartame, Sodium saccharin, Benzoic acid and Sorbic acid in ready to serve beverages commercially available in Sri Lanka. All five compounds are soluble in aqueous solution and easily be separated and determined by HPLC. This method was separated Acesulfame – K, Aspartame, Sodium saccharin, Benzoic acid and Sorbic acid ona C18 column with phosphate buffer and acetonitrile as mobile phase. Validation was performed in terms of good linearity, specificity, reproducibility, recovery, the limit of detection (LOD) and quantification (LOQ) values. Acesulfame–K, Aspartame, Sodium saccharin, Benzoic acid and Sorbic acid showed linearity within the 1-50 ppm range. The correlation coefficient (R2) for all the compounds tested was 0.999. Recovery of all the compounds ranged between 70% and 120%. The LOD values ranged between 0.853 and 1.792 ppm while the LOQ values ranged between 2.585 and 5.429 ppm. The relative standdeviations were ≤ 5% for all the compounds. The method successfully analyzed 36 samplesof ready-to-serve drinks commercially available in Sri Lanka.

Keywords: Acesulfame-K, Aspartame, Benzoic acid, Sodium Saccharin, Sorbic acid

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History and Current Status of Biofertilizer Development in Sri Lanka

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Abstract

Biofertilizers are substances that contain living organisms, which are able to improve plant growth and development. Biofertilizers are beneficial over conventional chemical fertilizers. The present review aimsto compile all available information on Sri Lanka's biofertilizer development from the beginning to the present. Research publications related to biofertilizers were collected, referred, and as the data screening data gathered, summarized, and analyzed in the methodology. The collected publications were research articles (109), abstracts (14), proceedings (39), case studies (2), and reports (3) were used. Granhall and his team in 1980 showed the usage of native *Scytonema simplex* and Indian biofertilizer as the first Sri Lankan biofertilizer study. Thus, in history, Cyanobacteria got the first attention as the Nitrogen-fixing biofertilizersin Sri Lanka. As the cyanobacteria, *Azolla* was also investigated to use as a biofertilizer at the preliminary level. In Sri Lanka, researchers mainly used Cyanobacteria, Plant Growth Promoting Rhizobacteria, Bio filmed Biofertilizers, and Arbuscular Mycorrhizal Fungi as the biofertilizers. Many researchers analyzed parameters for increasing grain yield and plant growth in rice varieties, maize, tea, coconut, rubber, soybean, vegetables, flowers, and other tree species tested. With technological advances, novel types of biofertilizer development also occurred. Launching the world's first commercial Biofilm biofertilizer in 2014 under the brand name "Biofilm-T" is the best example of novel biofertilizers. Commercial biofertilizer products like Bio Phos, Super Seed, Bio Gold, Biofilm – R, and Biofilm – T wereproduced in Sri Lanka. Mainly varieties of bio filmed-biofertilizer showed positive results with a 50% reduction in chemical fertilizers while increasing growth parameters and soil nutrient level like yield increment by 76.92% in potato, 20% in rice, and 4.87% in tea. The awareness and information about biofertilizers are not conveyed among farmers, thus their application of biofertilizers is also rare in the country. Lack of subsidies, correct support from the government, the link between the manufacturers and researchers, and encouragement for biofertilizer development may be reasons for this problem.

Keywords: Biofertilizer, History, Current Status

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Changes in Vegetation Covers of Sea Turtle Nesting Beaches along the Southern Coast of Sri Lanka

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Abstract

Vegetation is an important ecological component to nesting behaviors of sea turtles. This study was conducted to determine the changes of vegetation cover of nine most popular turtle nesting beaches of Ussangoda, Godawaya, Habaraduwa, Kalametiya, Mirissa, Rekawa, Kosgoda, Palatupana and Bundala along the southern coast of Sri Lanka from 2017,2019 and 2021 years by using remote sensing and GIS techniques. High resolution sentinel-2 satellite images from USGS EarthExplorer were subjected to apply the Normalized Difference Vegetation Index (NDVI) in order to calculate vegetation cover. Total buffered areas of NDVI for each beach were classified into water, land, sparse vegetation, moderate vegetation and dense vegetation. Ground-truthing was confirmed by in-situ ground observations and orthomosaic maps created by drone images from 48MP inbuilt camera of DJI Mavic Mini over 20 m from the ground. The accuracy analysis of Kappa-coefficient recorded more than 77.06% accuracy and overall accuracy recorded more than 82.44% at each site. Total vegetation areas have increased from 1.89km^2 to 2.13 km^2 at Palatupana, from 2.54 km^2 to 2.99 km^2 at Ussangoda, from 55.68 km^2 to 61.93 km^2 at Rekawa, from 1.78 km^2 to 1.84 km^2 at Mirissa, from 2.07 km^2 to 2.97 km^2 at Kosgoda while total vegetation areas have decreased from 2.82 km^2 to 2.64 km^2 at Bundala, from 8.65 km^2 to 5.02 km^2 at Godawaya, from 4.01 km^2 to 3.13 km^2 at Kalametiya, from 1.77 km^2 to 1.18 km^2 at Habaraduwa. During the 2017 - 2021 years, the total sparse vegetation cover of entire selected area of Southern Coast has decreased in 3.84%, moderate vegetation cover has decreased in 0.26% while dense vegetation cover has increased in 5.19%. Immersed anthropogenic and natural impacts would be the main reasons for the changes of the vegetation patterns. Due to the causes of coastal erosion and the loss of nesting shelter, a decrease in vegetation cover may have a negative impact on sea turtle nesting behavior. Bundala, Godawaya, Kalametiya and Habaraduwa are negatively affected by decrement of vegetation cover.

Keywords: Sea Turtles, Nesting, NDVI, Vegetation Analysis, Remote Sensing, GIS

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Analyses of Length – Weight, Length – Length Relationships and Condition Factor of *Auxis Thazard* (Frigate Tuna), Collected from Coastal Fishing Boats: A Study on Negombo Fishery Harbor, West Coast of Sri Lanka

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Abstract

Auxis thazard (Frigate tuna) is a commercially important neritic tuna species in Sri Lanka. Data on biometric parameters of this species is scanty. Therefore, this study was conducted to study the length-weight (LWR) and length-length (LLR) relationships, as well as the condition factor of frigate tuna. A total of 214 frigate tuna fish samples was collected from July 2021 to December 2021. The fish samples were collected from coastal day boats at Negombo fishery harbour that use gillnets as their principal fishing gear. The equations, $W = aL^b$ and $K = 100W/L^3$ were used to estimate the Length – weight relationship (LWR) and Fulton's condition factor (K) respectively. The LWR was $W = 0.0038TL^{3.3889}$. The pooled 'b' value 3.3889 indicated positive allometric growth ($b > 3$, t-test, $p < 0.05$). The K value of 1.51 ± 0.17 showed the relatively healthy conditions in fish population. Therefore *A. thazard* on the West coast are in a suitable, healthy environment. The results also indicated that the LLRs were highly correlated ($r^2 > 0.951$; $P < 0.001$). The Fish base reported the length at first maturity as 29.5 cm. The results showed that 17.29% are below 29.5 cm length. Therefore, continuous monitoring of fish landings is recommended to maintain a sustainable fishery for this important migratory fish species.

Keywords: *Auxis thazard*, Fulton's condition factor, Length – weight relationship

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Predicting the Influence of Pandemic for Sri Lankan Undergraduate's Academic Performances Using Data Mining Techniques

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Abstract

Educational Data Mining (EDM) has become a multidimensional field in recent years. One of the most significant uses of EDM is predicting student performance. Since the Covid-19 pandemic has led to the closure of educational institutions, the old EDM methods are no longer suitable for predicting students' performance. The purpose of the present study is to investigate the impact of the pandemic on undergraduates' academic performance. In this study, 750 data were collected by distributing a Google Form questionnaire to students in state and private universities in Sri Lanka. In the dataset, 32 columns were given different attributes, such as university, special area of study, gender, hours of learning, hours of sleeping, issues about the assignment submission and internet connection etc. Main target column was the Cumulative Grade Point Average (CGPA) column, which was considered the dependent variable and the other columns were independent variables. All data was preprocessed, and student performance was predicted using linear regression classification algorithms. Tow metric functions were used to evaluate the model namely 'explained_variance_score' metric and the 'r2_score', which were provided by the scikit-learn package in Python. The results show that excessive use of digital devices, internet connection, and some psychological factors negatively affect students' academic performance and mental health. However, it is evident that the majority of students prefer to complete their education online. In addition to the infrastructure issues mentioned in earlier research, problems with using an online learning system also include technical problems with the system, problems with change management, problems with course design, problems with computer self-efficacy, and problems with financial supports. To help policymakers, designers, developers, and academics better understand the key elements of the successful adoption of online learning systems, the study's findings offer significant suggestions. Any institute willing to conduct online learning further should consider about affected factors to the students' performance and measure the academic performance of the students. Moreover, this research will help to better understand the impact of pandemics on students' academic performance and identify areas where online learning approaches can be improved in Sri Lanka.

Keywords: EDM (Educational Data Mining), Online learning, Academic performance

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Anthurium Bacteria Diseases Detection and Classification Using Image Processing and Deep Learning Technique.

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Abstract

The floriculture industry is considered a high-income generating agribusiness and it can potentially be harnessed as a means of socioeconomic development in Sri Lanka. The study aims to explore the identify the early stages of bacteria diseases affected in Anthurium plants. Anthurium is very susceptible to bacterial diseases that can seriously limit commercial production. Bacteria Blight caused by Xanthomonas is probably the most serious. The spices of Xanthomonas that infect Anthurium have an extensive host range and can infect most aroid species; therefore, Anthurium plants may get blight when grown in proximity to other aroids. Like Bacterial Wilt caused by Ralstonia solanacearum. Ralstonia is known to infect several hundred plant genera. along with floriculture anthurium growers and expert Anthurium industries can quickly separate the affected plant and protect other plants. Timely and accurate diagnosis of leaf diseases plays a major part in preventing productivity loss and reduction of Anthurium floriculture products. From this proposed research collected the diseases infected images through manually and al the images are segmented. Therefore, a Convolutional Neural Network model (CNN) is created with the VGG16 architecture it helps to recognize the image and classify the stages of bacterial diseases. VGG16 architecture deal with problem of over fitting. Then the trained CNN algorithm trained groups are utilized. Developed to detect plant early-stage disease and classify Anthurium plant leaf images of healthy and diseased plants. As per the discussion It might be challenging to recognize and categorize distinct stages of the bacteria blight scar complaint since the significant different disease stage symptoms are often like one another. Moreover, this proposed research will help to identify the early stages of bacterial blight-infected plants. So, when infected plants are found, can discard immediately.

Keywords: Convolutional Neural Network, Xanthomonas, Ralstonia solanacearum, Floriculture

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Digital Transformation of Higher Education; A Conceptual Review

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Abstract

The notion of digital transformation has developed beyond a simple transfer of technology and has become an essential component of the business as a result of the rising influence of digital disruption across all industries. Higher education is one of the areas of the economy that has been most severely impacted by digital disruption and transformation at the moment. The economic environment is now experiencing quick and varied changes. This study also sought to explore the concept of digital transformation and provide a thorough overview of it in higher education to successfully implement it and enhance learners' learning experiences. The work is structured as a concept paper with a discussion of empirical insights, and the primary research methodology for the current study was a systematic literature review. The most recent literature was evaluated and extracted from reliable journals and other reliable sources to establish a conceptual framework for this study that adds new knowledge to the existing literature. The explanations and arguments in the current study follow a logical process, and they are backed up by relevant theories and empirical evidence. For a deeper understanding of "Digital transformation in the higher education sector," the researcher examined academic papers, periodicals, studies from research centers, technology advice, and strategy consultancies, as well as information from reputable websites. The paper ends with several suggestions for future scholars who wish to provide fresh insights into the field of higher education's digital revolution.

Keywords: Digital Transformation, Dimensions of Digital Transformation

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Preserving Privacy of Generation Z Android Users by Developing Sustainable and Secure Mobile Applications

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Abstract

Generation Z is the first generation of humans born with technology, and they have been widely exposed to technology from the beginning of their life span. Due to their nature, Generation Z users try to fulfil day-to-day activities using smartphones. Hence, their privacy-related data might be shared through the devices knowingly or unknowingly. However, the mobile app developers might not consider the source code security, especially for Android apps, which can raise privacy issues for the users, leading to attacks. Therefore, it is required to detect privacy-related code vulnerabilities when developing apps. This research proposes a highly accurate Machine Learning method to detect privacy-related Android source code vulnerabilities. The LVDAndro dataset was used to train the multinomial Naïve Bayes model to identify code issues using static analysis techniques. Vulnerable and non-vulnerable codes were extracted as features, and the Bag of Word technique was used to generate the feature vector. The multi-labelled classification approach was used since multiple vulnerable categories can be associated with a single vulnerable source code sample. The optimal solution was generated by tuning the model parameters. It has been proved that this model can detect privacy-related vulnerabilities in Android source code with 99% accuracy. Mobile app developers can use this model to analyse the source code and identify security vulnerabilities when developing applications by preserving the privacy of Generation Z users.

Keywords: Generation Z, Privacy, Android Code Vulnerability, Machine Learning

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Detect Color Measurement of Bread Crust During the Baking Process Using Mask R-CNN

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Abstract

Bread is a popular food item in most countries, even though baking has significant issues such as resource management and a considerable knowledge gap between experienced and inexperienced workers, which often results in difficulties in the baking process. Lacking experience and the unpredictability of the baking process, which depends on several factors, highlighted the need for a systematic approach to monitoring baking conditions. The main objective of this study was to identify the best color for bread crust. Three distinct baking phases were observed: unbaked, baked, and overbaked. Additionally, filtering, resizing, and flipping horizontally and vertically were applied during image preprocessing. In this study, 710 images were taken manually. Through its images and a mechanism for detecting the color of the crust, a model was created to determine the state of baking bread. This model used the Mask R-CNN (Mask Regional Convolutional Neural Network) algorithm with a supervised training dataset. Mask R-CNN is an instance segmentation based on Deep Convolutional Neural Networks (DCNN). The input images are processed by pretraining CNN, which uses a VGG (Visual Geometry Group) annotator for feature extraction. Those extracted features are fed into the region's proposal network, which acts as a classifier and regressor. RoI(Region of Interest) pooling uses feature maps as inputs, creating a fixed dimension of the object. Finally, softness, regressor, and mask classifiers will tell if the bread is fully baked, overbaked, or unbaked. The platform for Google Colab was used for the initial development. The model was implemented with the use of the Tensorflow, Skimage, and Keras libraries, and accuracy was evaluated using metrics. A dataset that included 710 color images (RGB) with different resolutions was selected to train the model and generate informative results, such as 96%–98% accuracy, indicating the implemented model's effectiveness. This model can be used as a definitive solution for resource and operation management of the bread baking process by providing understandable visual feedback for experienced or inexperienced bakers.

Keywords: Mask R-CNN, Baking, Image recognition, Bread browning, Deep learning

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Dr. Udari Uvindhya Rathnathunga	Faculty of Urban and Aquatic Bioresources, USJP, Sri Lanka
Dr. K. Prasannath	Faculty of Agriculture, Eastern University, Sri Lanka
Dr. Prabath Priyankara	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr (Mrs) N. D. Niluka Priyadarshani	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. A. D. N. T. Kumara	Faculty of Technology, South Eastern University of Sri Lanka
Dr. (Mrs). Niranjana Rodney Fernando	Faculty of Agriculture, Eastern University, Sri Lanka
Dr. (Mrs.) P. G. D. S. Amarasena	Entomology Division, Tea Research Institute of Sri Lanka

Dr. Chinthaka Sanath Gangabadage	Faculty of Science, University of Ruhuna, Sri Lanka
Dr. R. M. D. Anuruddha	Faculty of Technology, Eastern University, Sri Lanka
Dr. K. Premakumar	Faculty of Agriculture, Eastern University, Sri Lanka
Dr. Hasintha Wijesekara	Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka
Dr. K. M. C. Fernando	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. D. M. Gamage	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. T. Geretharan	Faculty of Agriculture, Eastern University, Sri Lanka
Dr. (Mrs.) DLC Kumari Fonseka	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. Jayani J Wewalwela	Faculty of Technology, University of Colombo
Dr. U. G. A. T. Premathilake	Faculty of Animal Science and Export Agriculture, UWU, Sri Lanka
Dr. K. H. P. Madushanka	Faculty of Engineering, USJP, Sri Lanka
Dr. (Mrs.) S. R. Amarasinghe	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. Champika Ellawala	Faculty of Engineering, University of Ruhuna, Sri Lanka
Dr. B. L. Sanjaya Thilakarathne	Faculty of Technology, University of Colombo, Sri Lanka
Dr. N. W. I. A. Jayawardana	Faculty of Agriculture, Rajarata University of Sri Lanka
Dr. I. R. Palihakkara	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. A. A. Maduka Subodinee	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. (Mrs.) Amani Mannakkara	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. K. G. C. Senarathna	Faculty of Technological Studies, UWU, Sri Lanka
Dr. (Mrs.) P. A. B. N. Perumpuli	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. W. M. C. J. Wijekoon	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Dr. Neelaka Molagoda	Faculty of Technology, Rajarata University of Sri Lanka
Dr. Thushari Wijeratne	Plant Physiology Division, Tea Research Institute of Sri Lanka
Dr. S. Pathmarajah	Faculty of Agriculture, University of Peradeniya, Sri Lanka
Dr. (Mrs.) S. N. Malkanthi	Faculty of Engineering, University of Ruhuna, Sri Lanka
Dr. Ireshika De Silva	Department of Chemistry, University of Colombo, Sri Lanka
Dr. Upul Kumarasinghe	Department of Chemistry, USJP, Sri Lanka
Dr. M. S. Nijamudeen	Field Crop Research & Development Institute, Mahailluppallama, Sri Lanka
Eng. A. Janarth	Faculty of Technology, Eastern University, Sri Lanka

Mr. T. M. S. A. Tennakoon	Faculty of Technology, Eastern University, Sri Lanka
Mr. R. Thivyatharsan	Faculty of Agriculture, Eastern University, Sri Lanka
Mr. M. Rajendran	Faculty of Agriculture, Eastern University, Sri Lanka
Mrs. U. Mathiventhan	Faculty of Science, Eastern University, Sri Lanka
Mrs. Amuthenie Sugirtharan	Faculty of Agriculture, Eastern University, Sri Lanka
Mr. S. Srikrishnah	Faculty of Agriculture, Eastern University, Sri Lanka
Mr. G. A. H. Galahitigama	Faculty of Applied Science, Sabaragamuwa University of Sri Lanka
Mrs. C. P. Rupasinghe	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Mr. S. Sotheeswaran	Faculty of Science, Eastern university, Sri lanka
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Mrs. D. A. B. N. Gunarathna	Faculty of Agriculture, University of Ruhuna, Sri Lanka
Mr. S. Thadchanamoorthy	Department of Computer Science, Tricomalee Campus, EUSL
Mr. M. Ramanan	Department of Information Technology, University of Jaffna
Mr. M. J. M. Fari	Faculty of Technology, South Eastern University of Sri Lanka
Ms. W. H. Pradeepa	Faculty of Technology, South Eastern University of Sri Lanka
Mrs. Tharsinithevy Kirupananthan	Faculty of Agriculture, Eastern University, Sri Lanka

Annex : Session Agenda- ARSFOT-2022 on 6th of October 2022

PARALLEL SESSION 1: *Environmental and Water Management Technology/Oral*

Time	***Abstract ID***	***Abstract Title***	***Authors***
1:00-1:15	ARS-FoT-2022-E-04	Production of Eco Friendly Handmade Paper from Water Waste Papers and Paddy Waste	*L.G.K.D.P. Liyanage, P.R.Fernando, D.P. Ubeysekar*
1:15-1:30	ARS-FoT-2022-E-09	Plant Community-based Biophysical and Biochemical Features Feedback of a Flood Episode in Kalu River Basin, Sri Lanka	*Bellanthudawa, B. K. A, Nawalage, N. M. S. K, Halwatura, D., S. H. Ahmed, S.H.4,, Kendaragama, K. M. N, Neththipola, M.M.T.D*
1:30-1:45	ARS-FoT-2022-E-01	Mycelium-Based Material Properties and 3D Printing for the Grow Fossils Structures and Crafts; A Bibliographical Review	*S.D. Abeywickrama, S.M. Pawuluwage, B.K.A. Bellanthudawa3*
1:45-2:00	ARS-FoT-2022-E-03	Composite Eco Friendly Sound-Absorbing Materials Using Various Natural Fibers	*R.M.S.B. Rathnayaka, P.R.Fernando, D.P. Ubeysekara*
2:00-2:15	ARS-FoT-2022-E-05	Remote Sensing Approach on Land Surface Temperature and Urban Heat Islands in Gampaha District, Sri Lanka	*B.B.P. Madumali, and P. J. E. Delina*
2:15-2:30	ARS-FoT-2022-E-06	Impact of Rainfall in the Catchment Area of Hydro Power Plant on Electricity Production From Hydro and Thermal Power Plant in Sri Lanka	*Dissanayake D.M.U.S, Kamshajini, R and Sooriyakumar, K*
2:30-2:45	ARS-FoT-2022-W-13	A survey of Public Perception and Attitude on Drinking Water Resources in Udunuwara DS Division in Kandy District	*Kannangara, N.U.S.K, Rajendran, M, and Janani Udeshika, K.K*
2:45-3:00	***Tea Break***		
3:00-3:15	ARS-FoT-2022-W-02	Residential Water Consumption Behavior in Hemmathagama Area, Kegalle District, Sri Lanka	*M.N.F. Nazma and M. Sugirtharan*

3:15-3:30	ARS-FoT-2022-W-06	Water quality Variation along the Nilwala River of the Southern Province of Sri Lanka.	*W.A.P.J.Premaratne, A, and G.R.Diwyanjalee, B*
3:30-3:45	ARS-FoT-2022-W-11	Impacts of Different Heating Temperatures on Soil Water Repellency: A Laboratory Approach Using Pine Forest Soil from Different Depths	*Perera, H.T.M, Leelamanie, D.A.*
3:45-4:00	ARS-FoT-2022-W-12	Effect of Treated Domestic Wastewater Irrigation on Growth and Yield of Okra (Abelmoschus esculentus).	*Swethika, A, Sugirtharan, M, Niroash, G and Nidharshan, T. D*
4:00-4:15	ARS-FoT-2022-W-14	Efficiency of Constructed Wetlands in Removing Pollutants from Wastewater - A Review	*K.G.N.I. Samarakoon* and M. Rajendran*
4:15-4:30	ARS-FoT-2022-W-08	Study on low-cost NODE MCU ESP8266 soil moisture sensor in monitoring soil moisture content under different types of land uses	*L. L. Matharage, and P. J. E. Delina*

PARALLEL SESSION 2*:* *Agriculture, Food and Marine Technology/Oral - 1*

Time	***Abstract ID***	***Abstract Title***	***Authors***
1:00-1:15	ARS-FoT-2022-A-03	Effect of Clarification on Quality of Palmyra Toddy	*Sivarathan, S, Subajini, M, Wijesinghe, W. A. J. P, Maathumai, S and Srivijeindran, S*
1:15-1:30	ARS-FoT-2022-A-04	Development of a Plant-based Milk Using Tropical Almond (Terminalia catappa L.) Nuts	*Samarasinghe, S.P.A.K., Chandimala, U.R, and Gunathilake, D.M.C.C*
1:30-1:45	ARS-FoT-2022-A-05	Assessment of Drought Tolerance Capability of Five Selected Finger Millet Genotypes in Sri Lanka	*G.P.G.I. Thakshila, D.R. Gimhani*
1:45-2:00	ARS-FoT-2022-A-08	Development of Fiber Enriched Biscuit using Jackfruit (Artocarpus Hetrophyllus) Rind Powder	*Lufna, M.A.F. and Mathiventhan, U .*

2:00-2:15	ARS-FoT-2022-A-16	Effect of Xanthan gum and Homogenization on the Stability of Palmyra (Borassus Flabellifer L) Ready to Serve Drink	*Datchian, S.A, Sobini, N,, Wijiesinghe, W.A.J.P, Mathumai, S, Srivijeindran, S*
2:30-2:45	ARS-FoT-2022-A-25	Investigation of Common Soil-Borne Pathogens Associated with Locally Produced Compost	*Fernando, M.N.U, and Subhashini, M.H.A.D,*
2:45-3:00	**Tea Break**		
3:00-3:15	ARS-FoT-2022-A-30	Fire Effects on Persistence of Soil Water Repellency in Eucalyptus Grown Soils in Upcountry Sri Lanka	*Piyaruwan, HIGS, Leelamanie, DAL*
3:15-3:30	ARS-FoT-2022-A-31	Investigating the Levels of Aflatoxins and Physiochemical Properties of whole Kernel Virgin Coconut Oil of a Selected Factory	*E. Abiramy, G.A.A.R. Perera and Ashoka puspakumara*
3:30-3:45	ARS-FoT-2022-A-33	Effect of King Coconut Husk Bio char on Nitrogen Retention in Sandy and Clay Soils Fertilized with Urea and Ammonium Sulphate	*E.M.G.N. Ekanayaka, D.K.R.P.L. Dissanayake, H.M.S.K. Herath and Anjana J. Atapattu*
3:45-4:00	ARS-FoT-2022-A-38	Characterization of Morphological, Physiological and Yield Parameters in Six Different Accessions of Lablab purpureus (L.) in Sri Lanka	*W.M.K.H.K. Senarathna, A.N.M. Mubarak and L.K. Weerasinghe*
4:00-4:15	ARS-FoT-2022-A-40	Development of Coconut (Cocos nucifera) Kernel-Based Curry Mixture	*K.D.C.N. Ubayasekara and G.A.A.R. Perera*

PARALLEL SESSION 3: *Agriculture, Food and Marine Technology/Oral - 2*

Time	***Abstract ID***	***Abstract Title***	***Authors***
1:00-1:15	ARS-FoT-2022-A-41	Changes in Consumer Food Consumption Behaviour during Covid-19 Pandemic in Mannar District, Sri Lanka	*Devinstan, J.A. , Manamperi, K.A.P. and Adikari, A.M.M.U.*
1:15-1:30	ARS-FoT-2022-A-43	Variation of Banana Fiber Yield under Different Agro-climatic Zones of Sri Lanka	*Priyadarshana, R.W.I.B*, Kaliyadasa, P.E, and Ranawana, S.R.W.M.C.J.K*
1:30-1:45	ARS-FoT-2022-A-45	Comparison of seed morphology among Sri Lankan wild rice species	*Parakkrama Wijerathna, Asanka Tennakoon, Salinda Sandamal, Disna Ratnasekera**
1:45-2:00	ARS-FoT-2022-A-46	Identifying suitable preservation technique for king coconut water (Cocos nucifera var. aurantiaca) using naturally available ingredients and its quality assessment	*H.M.T. Herath* and T. Mathiventhan*
2:00-2:15	ARS-FoT-2022-A-47	Effect of Photoperiod on selected Agronomic and Yield Characters of Three Sri Lankan Traditional Rice Accessions	*W.H.D.U.Pushpakumari , L.A. L.W. Jayasekera, Gamini Senanayake, D M J B Senanayake,Sudarshanee Geekiyanage**
2:30-2:45	ARS-FoT-2022-A-24	Quality Evaluation of Mushroom Powder Incorporated Cake	*Gunaliney, E and Mahendran, T*
2:45-3:00	***Tea Break***		
3:00-3:15	ARS-FoT-2022-A-22	Validation and Quantification of Commonly Used Sweeteners and Preservatives in Ready-to-Serve Beverages Available in Sri Lanka	*H.A.K.N.Kavindi*, I.J.Ambepitiya , and K.G.C.Senarathna*

3:15-3:30	ARS-FoT-2022-A-12	The Effects of Edible Oil Coatings on the Quality of Chicken Eggs Stored under Room Temperature	*Hisanithy, P and Mahendran, T*
3:30-3:45	ARS-FoT-2022-A-02	A Study on the Present Status of Meat Consumption of University Students Amidstthe Covid-19 Pandemic: A Case Study in Faculty of Agriculture, University of Ruhuna, Sri Lanka	*De Silva, S.T.D., Karunathilaka, T.D.a, Herath, H.M.T.K.1a, Madurapperuma, M.A.N.L.a, Pathiraja, P.M.T.R., Rathnayaka, R.M.M.M., Sarada, G.M.S.A. and Gajaweera, C.J.**
3:45-4:00	ARS-FoT-2022-M-01	Changes in Vegetation Covers of Sea Turtle Nesting Beaches along the Southern Coast of Sri Lanka	*B.G.D.O. Perera*, E.P.D.N. Thilakarathne, A.P. Abeygunawardana, G.A.J. Sandamali, K.U.D.N. Hansani, W.M.P.U. Weerasingha1, W.G.I.T. Gunathilaka*

PARALLEL SESSION 4: *Information and Communication Technology/Oral*

Time	***Abstract ID***	***Abstract Title***	***Authors***
1:00-1:15	ARS-FoT-2022-IT-03	Predicting the influence of pandemic for Sri Lankan undergraduates academic performances using Data Mining Techniques	*Sewwandi, M.D.W.H, Jayasinghe, P.K.S.C*
1:15-1:30	ARS-FoT-2022-IT-06	Preserving Privacy of Generation Z Android Users by Developing Sustainable and Secure Mobile Applications	*Nadeeka Pathirana an* Janaka Senanayake
1:30-1:45	ARS-FoT-2022-IT-07	Detect Color Measurement of Bread Crust During the Baking Process Using Mask R-CNN	*Rashmini N Hewavitharana*

PARALLEL SESSION 5: *Poster Presentation*

Time	***Abstract ID***	***Abstract Title***	***Authors***
1:30-1:35	ARS-FoT-2022-E-02	Market Survey of Personal Care Products Leading to Inland Microplastics Pollution in Sri Lanka	*Nawalage, N.M.S.K and Bellanthudawa, B.K.A*
1:35-1:40	ARS-FoT-2022-E-08	Refrigeration Sector Maintenance Analysis of Sri Lanka	*S Jivanth, A. M. R. N. Attanayake, and R. K. W. H. M. K. Elkaduwe*
1:40-1:45	ARS-FoT-2022-W-09 1	Investigating the Feasibility of Locally Aavailable Moringa Oleifera to treat high turbidity water	*Sandaruwan, A.M.T, and Madusanka, K.H.P*
1:45-1:50	ARS-FoT-2022-W-05	Sustainable Drainage Medium Design Decision Making- Optimization of Porosity of Porous concrete with Compressive Strength	*Janarth, A, and Dasinaa, S*
1:50-1:55	ARS-FoT-2022-A-06	Cooking Quality Characteristics and Iron (Fe) Content of Most Popular Rice varieties in Sri Lanka	*Herath, H.M.W.U, Senanayake, D.M.J.B* and Wimalasiri, K.M.S3, Silva, N.R.N*
1:55-2:00	ARS-FoT-2022-A-09	Distribution of Sodium, Magnesium and Potassium in Paddy Growing Soils of Sri Lanka	*Delgoda K.H.B.H., Neththasinghe N.A.S.A. Chandrasekara E.D.C.T., Suriyagoda L.D.B.1*
2:00-2:05	ARS-FoT-2022-A-10	Assessment of Toxic Heavy Metal Concentrations of Paddy Soils in Sri Lanka	*Neththasinghe, NASA, Chandrasekara, EDCT, Delgoda KHBH, Sirisena, DN, Kadupitiya, HK, Dissanayaka, DMSB, Ariyarathne, M, Chandrajith, R, Suriyagoda LDB*
2:05-2:10	ARS-FoT-2022-A-13	Effect of Different Fruit Peels on The Growth and Yield of Lettuce	*Madhusha, G, Varnika, K, Jeyavannan, K , Mayakaduwa,M,A,P*

2:10-2:15	ARS-FoT-2022-A-14	Effect of High-Density Planting on Timber Production and Structural Changes of Rubber Trees (Hevea Brasiliensis Muell.Arg.)	*K.B.M.V.M.T.M.Muhandira*, Mr.T.U.K.Silva, Mr.Wasantha Senevirathna, Mrs.P.Wasana Jeewanthi*
2:15-2:20	ARS-FoT-2022-A-15	Effect of Maturity and Stem Girth of Super Napier GrassCuttings on Selected Initial Growth Parameters	*Perera, P.W.A., Madumadhawa, M.H.D., Manewa, R.M.S.S. and Palliyaguru, O.G*
2:20-2:25	ARS-FoT-2022-A-32	Development and Quality Evaluation of Oyster Mushroom (Pleurotus Ostreatus) Flour Base Noodles Product	*P.N.G.V.Jayanath, T. Mathiventhan*
2:25-2:30	ARS-FoT-2022-A-37	Bio Efficacy of different Non-Hazardous Alternative Chemicals and Commercial Fungicides for Controlling Groundnut Stem Rot by Sclerotium rolfsii. S	*Pushpakalaa Muththaiya, Herath.P.G.H.M* ,Jeyavanan.K 1,Varnika.K1,Jathikula.R2, Kujinsiga.J.*
2:30-2:35	ARS-FoT-2022-A-42	Geographical Distribution and Morphological Characterization of Tropical Almond (Terminalia catappa L.) in Hambantota District, Sri Lanka	*Ketipearachchi, K.G. , Subasinghe, S., Vidanapathirana, N.P.1, Silva, T.D.*
2:35-2.40	ARS-FoT-2022-A-44	Farmer issues on Solanum virginianum (Katuwelbatu) Cultivation	*Siriwardena, B. P, Ketipearachchi, K. G, Rajasekara, L. R. W. D. M*
2:40-2:45	ARS-FoT-2022-A-39	Soil Application of Chitosan on the Yield and Yield Components of Thilina Tomato (Solanum lycopersicum L.)	*Amarasekara, S.W.S.A, Sukanya, M, Hewavitharana, K.H.I.K.*
2:45-2:50	ARS-FoT-2022-A-35	Effect of integrated use of Wedelia trilobata plant extract with commercial fungicides for the management of Black Rot disease in Tea	*J.H.D.M Jayarathne, N.G.D.N. Nikagolla and J.K.H.Sampath*
2:50-2:55	ARS-FoT-2022-A-26	Determination of the phytochemicals in Kappetiya (Croton laccifer) leaves & comparison of the two different extraction methods to extract Kappetiya (Croton laccifer) leaves: Hydrodistillation and Soxhlet extraction	*K.T.D.Kariyawasam and Dr.K.H.I.K.Hewavitharana2*

2:55-3:00	ARS-FoT-2022-A-19	History and Current Status of Biofertilizer Development in Sri Lanka	*Manathunga, D.M.K.K. and Singhalage, I.D.*
3:00-3:05	ARS-FoT-2022-IT-04	Anthurium Bacteria Diseases Detection and Classification Using ImageProcessing and Deep Learning Technique.	*Nasrin N.F, Wickrama Arachchi R.S*
3:05-3:10	ARS-FoT-2022-IT-05	Digital Transformation of Higher Education; A Conceptual Review	*W. N. Sellahewa, T.D. Samarasinghe and M.D.E.D.A Naranulpatha*

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