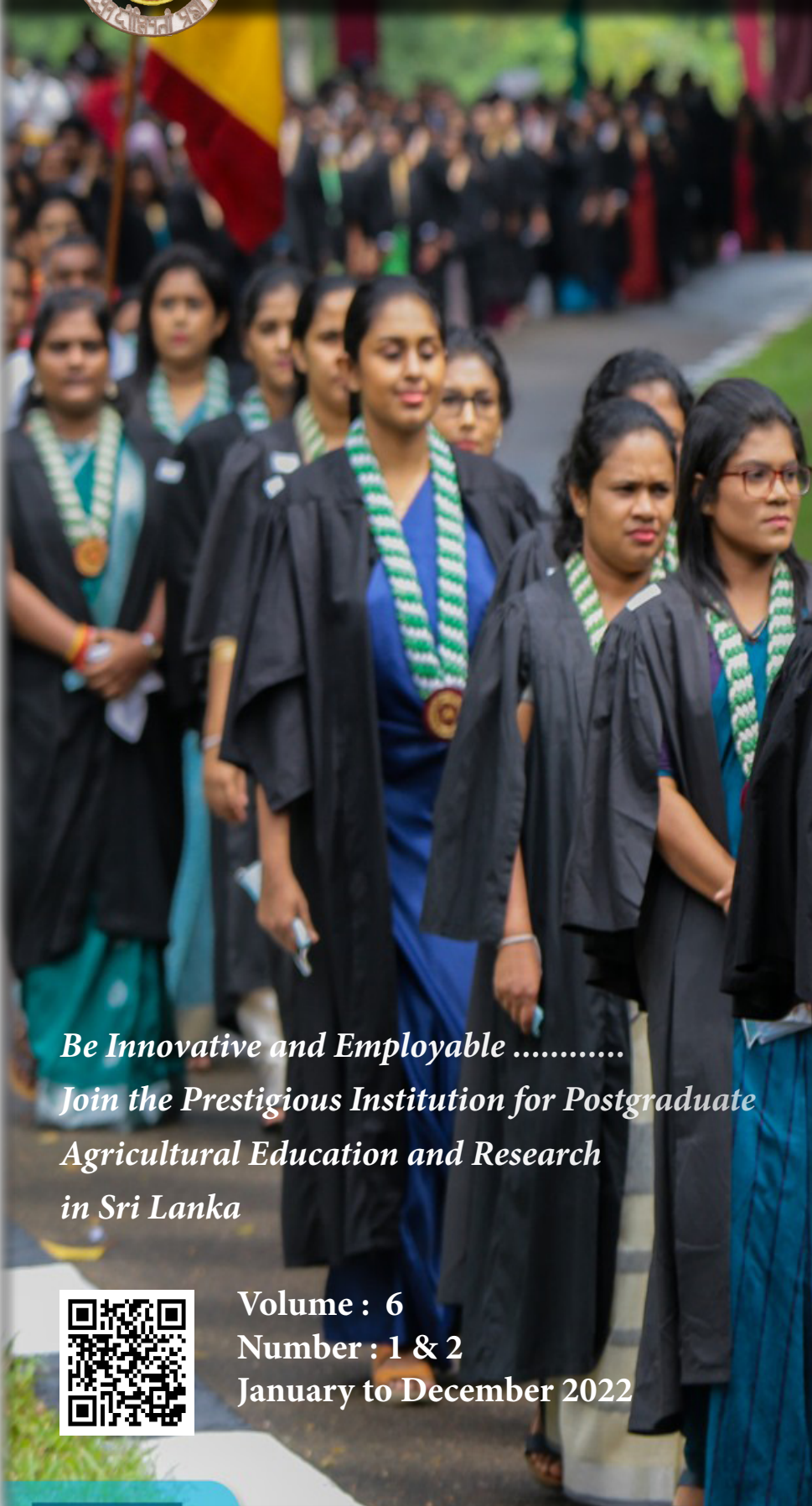


PGIA NEWS



The Newsletter of Postgraduate Institute of Agriculture, University of Peradeniya



Be Innovative and Employable
Join the Prestigious Institution for Postgraduate
Agricultural Education and Research
in Sri Lanka



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ABOUT THE NEWSLETTER

Established in 1975, the Postgraduate Institute of Agriculture (PGIA), affiliated to the University of Peradeniya is a prestigious Institution devoted to the development of higher level manpower in agriculture and related areas in Sri Lanka. During its over four decades of existence, it has made tremendous progress in developing nationally and internationally important consortium of degree and non-degree programmes together with necessary infrastructure for teaching and research. Its' biggest strength is the availability of qualified and experienced staff, both from within the university and outside research and development institutes and linkages with many reputed international universities and research centers. PGIA NEWS is the main organ for the communication of various activities of the institute to the policy makers, academic community, stakeholders and the general public. It is published semi-annually and incorporates current news, research briefs and other information relating to agricultural education, research and development. The PGIA requests comments/suggestions from the readers on this newsletter if any, to improve its quality and content in the future issues.



UNIVERSITY RESEARCH SHOULD FOCUS ON NATIONAL DEVELOPMENT

EDITOR'S MESSAGE

Research is an important subject that is intertwined with higher education in universities of both developed and developing countries of the world. There is no development *sans* research. Sri Lankan economy has to be strongly based on technology and innovation, thus the role of the universities in developing human capital will be very crucial. Research is critical for economic development and it is equally critical to the mission of any university.

The developed nations are moving away from manufacturing-based economies to the so called knowledge-based economies that rely heavily on scientific research and trained workforce. Thus, they are dependent on trained workers, intellectual property and knowledge. Our universities are producing larger number of undergraduates and postgraduates every year and that outputs should be of highest quality; they should also remain as the main generators of knowledge and innovation. This should be our approach for future development of this country. Research has multiple benefits economic, social and environmental that concern all citizens. Research has foundation for knowledge that makes possible for innovation and application that provides wider benefits to society. Research excellence in a university goes hand in hand with teaching excellence.

Sri Lanka has established full-fledged university system with 15 national universities. There are several semi-autonomous postgraduate institutes (PG) and Faculties of Graduate Studies which are discipline oriented and affiliated to traditional universities. The postgraduate research is a mandatory function of all the above institutions. However, there are very few full time PG students at M.Phil. and PhD level enrolled in these institutions. Thus, the total output of M.Phil/Ph.Ds are abysmally low when compared to other leading universities in the region. The less enrolment for research degrees may be attributed to several factors such as stiff competition for employment as undergraduate and graduate output increase every year, non-availability of scholarships and inability for self-financing. The research outputs of universities are pathetically low compared to the leading universities of the region. The publications in peer reviewed journals are also very few, sometimes less than one paper per academic.

The mechanism for the dissemination of research in the universities is mainly through publications. Many faculties and departments have their own journals. It is reported that there are about 30 journals currently published by the universities, but very few of them has reached citation indexed status. Inability to reach citation index status is a reflection of many factors among which the quality of articles, frequency and timeliness of the publications and the editorial process are important. The first requirement is to achieve excellence in research in terms of their intrinsic merit and quality. The capacity enhancement of the editorial staff is a must to improve the quality of publications. The above aspects deserve attention of the universities/PG institutes to improve the quality of research.

Another point of interest about university research is their relevance to society, to ordinary citizens. A major portion of university research should be public good research. This is important particularly for developing countries. The prioritization is important for selecting research of relevance as it is a costly investment. While appreciating the importance of maintaining academic freedom in the selection of innovative research projects, their relevance to society cannot be ignored.



The universities appear to exist in isolation in regard to R&D activities. The society rarely consults the university regarding research and development and the universities do not search for what research is needed by the society. Thus, the research done by the universities remain mostly unused. This gap between the universities and society should be overcome through appropriate client oriented research projects. It is important to realize that universities are the reservoirs of knowledge and lead institutions that could generate cutting edge research. If relevant research is conducted in the universities that could fast track the development of any nation.

Industry – university partnerships is a hot topic when it comes to research funding. It is the main and the most reliable source of funding in the developed countries. In Sri Lanka, the industrial sector is not strong and unable to provide sustained long term funding for research. The local industries prefer to fund short term research to solve their immediate problems. Furthermore, the export oriented industries mostly depend on the imported technologies from their contacts abroad. When funding issue is raised at research conferences, often we are told that funds are not a problem, but the researchers are not able to access those funds. They attribute this mainly to inappropriate problem identification and poor proposal preparation. Therefore, it is important to train researchers in writing effective research proposals for canvassing funds.

There are many international donors, foundations and research centers which provide research funds, especially for scientists in developing countries. These funds have to be secured to conduct good quality research by the universities to develop a vibrant research culture. At present the university research does not appear satisfactory.

The universities hold the cream of the society and the most important resource the country owns. However, the research outputs are unimpressive and impacts are very low. The university research has neither supported university development nor national development. Then the question is how to mobilize this massive resource to be more productive generators of knowledge and innovation to help the economic development of this country.

“If we knew what it was we are doing, it would not be called research, would it ”

Albert Einstein

MAIN STORY

34th PGIA Annual Congress Successfully Concluded

The PGIA Annual Congress is a scientific forum for researchers to present, discuss and disseminate their scholarly research findings in agriculture and allied disciplines to a wider national and international scientific community. The 34th Annual Congress of the PGIA was held from 17-18 November, 2022 as a virtual conference at the Postgraduate Institute of Agriculture, University of Peradeniya.



It provided an opportunity for postgraduate students and budding scientists to showcase their research findings to an virtual audience comprised of academics, researchers, PGIA alumni and other stakeholders. In this year, 30 oral and 17 poster presentations were made under 7 scientific sessions: Oral technical sessions were Tools for climate resilient agriculture, Molecular approaches for improving plant performances, Curbing losses in production and products, Social dimensions in food and environment and Soil and water resource management. Poster sessions were on Resource Management in Agriculture and Forestry, and Society Attributes in Agriculture.

Inaugural session was held on 18th November 2022 with a very limited number of on-ground participants. Ms. Anouk Baron, Deputy Ambassador of the Kingdom of the Netherlands to Sri Lanka and Maldives graced the inaugural session as the Chief Guest. Distinguished Professor Owen Atkin, Director, Centre for Entrepreneurial Agricultural Technology; Australian National University, delivered the keynote speech on “Using advances in technology to develop climate-ready crops for the future”.

Professor Gordon A. Gow, Acting Director, Media & Technology Studies, University of Alberta, Edmonton, Canada and Professor Emmanuel Frossard, Institute of Agricultural Science, Lindau, Switzerland delivered invited speeches. Professor Lasantha Weerasinghe coordinator of the 34th Annual Congress and Mr. Lahiru Chathuranga, President of the Postgraduate Student Association (PASA) also addressed at the inaugural session. Several other dignitaries including Professor M.D. Lamawansa, Vice Chancellor, University of Peradeniya, Professor S.S. Kodituwakku, Dean, Faculty of Agriculture and Professor C.M.B. Dematawewa, Director, PGIA addressed the inaugural session of the Congress.

In order to improve the communication skills and effective dissemination scientific findings by budding scientists, four pre-congress workshops were also held on different topics related to publications and presentations. These workshops and technical sessions were well attended by the participants. Dr. Gamini Samarasinghe, Additional Secretary (Agriculture Technology), Ministry of Agriculture delivered the Distinguished Alumnus speech at the closing session of the Congress.





BEST PRESENTERS & AWARDEES IN THE TECHNICAL & POSTER SESSIONS

Oral Presentations

Technical Session	Title of the Paper	Presenter
Tool for Climate Resilient Agriculture	Development and Validation of a Model to Simulate Phenology, Canopy Growth and Yield of Maize, Mungbean and Tomato Under Tropical Smallholder Farming Systems	J.B.D.A.P. Kumara
Molecular Approaches for Improving Plant Performances	Assessing The Impact of Elevational Variation on Health-related Properties in Green Leaves, Black Tea, Green Tea and Instant Tea Made out of selected Clone (TRI 2025) in Low, Mid and Up Country of Sri Lanka	K.A.P. Dalpathadu
Curbing Losses in Production and Products	Comparison of High-Performance Liquid Chromatography (HPLC) Profiles and Antimicrobial Activity of Genus Cinnamomum Species in Sri Lanka.	B.S. Bandusekara
Social Dimensions in Food and Environment	Assessment of the Scope of Homegarden in Realizing Household Food Requirement and Dietary Diversity; a Case of Selected Districts in Sri Lanka	W. A. M. Lowe
Soil and Water Resource Management	Tank Sedimentation and Soil Erosion Simulations of the Sub-catchments Under Present Land Use Scenario and Conservation interventions in Palugaswewa Tank Cascade System, Sri Lanka	P. Kowshayini

Overall Best Presenter

J.B.D.A.P. Kumara

Title: Development and Validation of a Model to Simulate Phenology, Canopy Growth and Yield of Maize, Mungbean and Tomato Under Tropical Smallholder Farming Systems



Poster Presentations

Poster Session	Title of the Paper	Presenter
Resource Management in Agriculture and Forestry	Development of a Botanical Formulation Using <i>Cinnamomum verum</i> and <i>Pongamia pinnata</i> Leaves for Suppression of Soil Nitrification	P.A.M. Dias
Society Attributes in Agriculture	Assessment of Virtual Water of Irrigated Agriculture, Imports, Exports and Water Footprint for Sri Lanka.	W.C.S. Wanas-inghe



Awards

A. W. R. Joachim Memorial Award

This award is presented to the student who earned the highest GPA in each academic Year.
Ms. W.D.E.P.A. WITHANA from the Board of Study Soil Science won this award for the year 2021.

PGIA Alumni Award

Winner : J.B.D.A.P. Kumara
1st Runner up : P. Kowshayini
2nd Runner up : B.S. Bandusekara





Hantana Essence: PGIA Congress in Brief



Winner	Efficacy of introduced non-chemical methods to control wax moth in honey-bees in Sri Lanka	S.A.D. Thakshila
1st Runner up	Indiscriminate fertilizer application has degraded vegetable cultivating soils in central highlands	H.A.N. Upekshani
2nd Runner up	Gene pyramiding for common bean rust resistance	H.M.P.S. Kumari

ACADEMIC NEWS

Admissions for the Academic Year 2022

Applications for the academic year 2022 were called, and more than 1030 applications have been received for both Peradeniya and Colombo intakes. The academic year 2022 began at the Peradeniya branch on March 28, 2022, and at the Colombo branch on October 1, 2022. Altogether 514 students were registered as regular students including 445 at Peradeniya while 69 students were registered for Colombo branch.

MBA Association Organize Orientation Programme

The Orientation Programme of the 2022 MBA Batch was held on 2nd April 2022. Mr. Upul Jayaweera, Associate Director, Australian National Bank, an MBA Alumni was the key note speaker at the event. The event was graced by Prof. Sarath Kodithuwakku - Founder of the MBA programme and Dean of Faculty of Agriculture, Dr. CMB Dematawewa- Director of PGIA, KAB Damunupola – Deputy Registrar of PGIA, Prof. Pahan Prasada – Chairperson of the Board of Study of Business Administration, Dr. Dilini Hemachandra – Secretary of the Board of Study of Business Administration, lecturers and MBA students of 2020 and 2022 Batches. The new students had the opportunity to meet the distinguished panel of lecturers and interact with the current students. It was organized by the MBA Association.



Short Course on ICT Stewardship for Agricultural Extension

The Board of Study in Agricultural Extension successfully implemented the second offering of postgraduate short course on 'ICT Stewardship for Agricultural Extension'. This year, the course was offered online for a period 10 weeks from 6th September – 15th November 2022. Twenty nine extension professionals, representing both government and private sectors attended the program. The short course aimed to promote technology stewardship among practitioners in the field of agricultural extension. The course was designed to introduce and equip the technology stewards with basic skill sets required to utilize appropriate low cost digital ICT's for communication, training and knowledge transfer campaigns within their communities of practice.

The key resource persons for the short course were Prof. Gordon Gow, University of Alberta, Canada; Dr. Uvasara Dissanayeke, Faculty of Agriculture, University of Peradeniya, Dr. Chandana Jayathilake, Wayamba University of Sri Lanka and Dr. Ataharul Chowdhury, University of Guelph, Canada. Dr. Uvasara Dissanayeke coordinated the short course. Ms. Ishani Herath and Ms. Ranmalee Serasinghe supported as the teaching facilitators.

The certificate awarding ceremony was held on 15th November 2022 at the R.R. Appadurai Auditorium with the participation of Prof. C.M.B Dematawewa, Director, Mr. K.A.B Damunupola, Deputy Registrar and Ms. S. Ranasinghe, Bursar of the PGIA. The participants are expected to complete a capping project with a selected community in the coming year.



Needs Assessment Workshop With External Stakeholders

A Needs Assessment workshop was organized by the Board of Study Soil Science to identify the expectations of the potential employers of the graduates holding a Master and M.Sc. degrees in Soil Science. It was held on March 3, 2022 at the Main Auditorium of PGIA. Altogether, 21 participants from various institutes in public and private sector in Sri Lanka participated in the event. They represented research stations of the Department of Agriculture, Ministry of Environment, Ministry of Lands and Land



Development, International Water Management Institute, CIC Agri Business (Pvt) Ltd, Lankem Ceylon PLC, Dole Lanka (Pvt) Ltd, Food and Agriculture Organization (FAO), United Nations Development Programme (UNDP), Environment and Forest Conservation Division and Mahaweli Authority. The outcome of this workshop will be incorporated in the next curriculum revision.

Participants explained the specific technical knowledge and skills; and interpersonal and other skills that they expect from a postgraduate degree holders in their respective institutes/companies. After a short presentation on the content of the existing three degree programs, the participants made suggestions on new topics/areas to be included in the degree programs.

New Board of Management members Appointed

The following ex-officio members were appointed to the Board of Management with effect from 16th January 2022 - 15th January 2025.

Mr. K.G.P. Pushpakumara (Additional Director General, Department of National Budget, Ministry of Finance), Ms. A.M.J. Ilankoon Menike (Director General, Department of Agriculture), Ms. A.P.P. Disna (Director General, Department of Export Agriculture) and Dr. G.V.T.V. Weerasooriya (Dean, Faculty of Agriculture, Rajarata University) Prof. R.P. De Silva (Vice-Chancellor, University of Vocational Technology) was appointed by the University Grants Commission.

Prof. D.V.P. Prasada, Prof. M.I.M. Mowjood, Dr. U.I. Dissanayake, Prof. J.K. Vidanarachchi, Dr. S.D.S. Hemachandra, Prof. C.K. Beneragama, Mr. P.C. Arampath, Prof. K.S. Hemachandra and Prof. R.S. Dharmakeerthi were elected as the members from Faculty of Agriculture.

General Convocation 2019 and 2020

The 82nd and 83rd General Convocations of the University of Peradeniya were held with much splendor at the University Gymnasium on 22nd – 24th of February 2022, and 30th-31st August 2022 respectively. A total of 348 graduates of the PGIA inclusive of 25 Ph.D., 26 M.Phil., 267 M.Sc. and 30 MBA were conferred degrees at these Convocation ceremonies.



QUALITY ASSURANCE; HIGHEST PRIORITY OF PGIA

The global higher education is expensive and very competitive as every country strives to develop a knowledge-based economy through planned higher education of human resources in specific areas of interest. As a result, there is a great deal of interest in demonstrating the quality of all programs offered by public and private higher education institutions. This is especially true for developing countries like Sri Lanka, which generate talent not only for the needs of developed countries, but also for their own development initiatives. Therefore, the primary responsibility of all higher education providers worldwide is to ensure the quality of the programs they offer and to develop a culture of quality in higher education. Thus, it becomes very important for Sri Lankan universities to establish and implement a comprehensive Quality Assurance (QA) process within the university and conduct regular external reviews.

The Internal Quality Assurance Cell of the Postgraduate Institute of Agriculture (IQAC-PGIA), University of Peradeniya was established in 2020 under the Center for Quality Assurance (CQA), University of Peradeniya. IQAC-PGIA is responsible for coordinating all the QA related activities within the PGIA in liaison with the CQA of the University according to the guidelines issued by the UGC Circular No. 04/2015. IQAC-PGIA is currently engaging in the Institutional Review (IR-2018-2022)-University of Peradeniya and Postgraduate Program Reviews (PR) of Postgraduate Institute of Agriculture (PGIA) for the PhDs and MPhils in 2023. The PG institutes will need to prepare the Self Evaluation Review Report (SER) which has to be finalized by May 2023. It was noted that these reviews will be conducted by independent external reviewers appointed by the UGC and will be based on the SER and other relevant information which has to be prepared by the respective institutes. Dr. H.M. SANJEEWANI WASANA is currently working as the PGIA-IQAC Coordinator and representative to the Management Committee of the Center for Quality Assurance (CQA)-UOP.

Functions and responsibilities of the IQAC-PGIA are in the broad range of academic and administrative disciplines. The overall responsibility of the IQAC is assisting and monitoring academic and administrative activities to ensure quality of the degree and non-degree programmes, research activities and outreach activities of the institute based on the PGIA strategic plan by focusing on to:

- Facilitate the integration of appropriate methods of teaching and learning to assure efficient and progressive performance of postgraduate students and participants of the non-degree programmes offered by the institute
- Prepare, validate and approve documents pertinent to academic and governing functions of the institute
- Make academic and non-academic staff and students of the institute aware of the importance and relevance of Quality Assurance to enhance the quality of degree programmes offered by the institute.
- Conduct frequent stakeholder surveys to assess the impact of activities conducted by the institute and utilize feedback to increase efficiency and effectiveness.
- Facilitate the Institutional Review (IR) of the University of Peradeniya, Program Reviews (PR) of the institute and all other quality related activities.
- Develop and follow up activities based on the feedback of IR, PR and other quality assurance related things
- Facilitate the development of the policy documents of the institute in relation to the development of curricula and courses, teaching, learning and assessment strategies, and research and development activities
- Identify areas needing support and improvement (i) to demonstrate quality and relevance of higher education in agricultural sciences, (ii) to improve the quality of the services provided by the institution, and (iii) to enhance research culture

“Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives”



Prof. Buddhi Marambe Awarded Lifetime Achievement Award by IWSS

Dr. Buddhi Marambe, Senior Professor of the Department of Crop Science, Faculty of Agriculture, University of Peradeniya, has been awarded the prestigious “Lifetime Achievement Award” by the International Weed Science Society (IWSS). The award reflects the commitment and achievements of Prof. Marambe in the field of weed science. The award was presented at a ceremony held at the Marriot Hotel in Bangkok, Thailand, on 8 December 2022 at the closing session of the 8th International Weed Science Congress. This year, Prof. Marambe was the only Weed Scientist honored from the South and Southeast Asian region with this once-in-a-lifetime award. Prof. Buddhi Marambe is a member of the Board of Study in Crop Science.



Congratulations: Dr. Sanjeewani Wasana for Global Scientific Achievement



Dr. H.M. Sanjeewani Wasana, Senior Lecturer-PGIA was awarded the President's International Fellowship Initiative (PIFI) as an Associate Professor, under the visiting scientist category offered by the Chinese Academy of Sciences (CAS) in December 2022. (CAS has been ranked the No. 1 research institute in the world by Nature Index since the list's inception by Nature Portfolio). By now, five professors of the UoP have been awarded the PIFI fellowship and Dr. Wasana is the youngest to achieve the fellowship.

The CAS- President's International Fellowship Initiative (PIFI), is a highly competitive prestigious funding program to attract talented foreigners to CAS for scientific exchanges and research cooperation. It is open to scientific research personnel from around the globe. Certificates were awarded to the PIFI Visiting Scientists of 2021/2022 with the participation of Prof. M. D Lamawansa, Vice Chancellor of the University of Peradeniya, Prof. Yuansong Wei, Director, Laboratory of Water Pollution Control Technology, Research Center for Eco-Environmental Sciences- CAS. PIFI Visiting Scientists for the year 2021 and 2022 are; Prof. S.H.P. P. Karunaratne (UoP), Prof. K.B. Shameen Jinadasa (UoP), Prof. J.G. Shirani Ranasinghe (UoP) and Dr. H.M. Sanjeewani Wasana (PGIA-UOP).

Ms. Maathumai Sivaji, Winner of the 3 Minute Thesis (3MT) Competition in the iOURS 2022.

Ms. Maathumai Sivaji, M.Sc. (CW & R) in Food Science and Technology was the winner of the 3 Minute Thesis (3MT) Competitions in the International Open University Research Session (iOURS 2022) held on 10th and 11th November 2022. Ms. Sivaji presented her research thesis titled “Development of meat tenderizer using *Bryophyllum pinnatum* leaf extract and its comparison with commercially available meat tenderizers Papain and Bromelain”. Mr. P. C. Arampath, Dept. of Food Science & Technology, Faculty of Agriculture of the University of Peradeniya and Prof. R. Kapilan, Dept. of Botany, Faculty of Science of the University of Jaffna served as supervisors of her research.



New Staff Appointments



Dr. Dineesha appointed as Temporary Senior Lecturer

Dr. Dineesha Balagalla appointed as Temporary Senior Lecturer of the PGIA. She obtained her PhD from Hokkaido University, Japan in 2021 in molecular plant pathology, for the study conducted on fungicide resistance development in *Pyricularia oryzae*. She also obtained an MBA from Cardiff Metropolitan University, UK and an MPhil from the University of Ruhuna, Sri Lanka. Her MPhil research focused on developing a novel tissue culture technique to multiply sugarcane plantlets.

Thakshila joined as a Management Assistant

Mrs. Thakshila Rajanayake joined the PGIA on 17 October 2022 as a Management Assistant and assigned to work at the Registration branch. Previously, she was employed at the Open University of Sri Lanka also as a Management Assistant.



Priyantha appointed as a work aid

Mr. Priyantha Siriwanasa was appointed as a work aid to Registration branch of the PGIA with the effect from 1st June 2022. Earlier he has worked as a work aid at the Admission branch of University Grants Commission of Sri Lanka.

Chamali: New PGIA Course Coordinator

Chamali Wickramasinghe; the new Course Coordinator (from 1st December 2022) of the PGIA holds B.Sc. in Agriculture Technology and Management from the Faculty of Agriculture, University of Peradeniya. After graduating, she has held positions as temporary lecturer and research assistant at the Department of Agricultural Engineering. She is currently enrolled for M.Sc. at the Postgraduate Institute of Agriculture, University of Peradeniya. Ms. Chamali will work as the Secretary of the PGIA Newsletter.



Ishani appointed as Tutor

Ms. Ishani Herath was appointed as Tutor, Board of Study Agricultural Extension, Post-graduate Institute of Agriculture from 26 March 2022. She holds B.Sc. in Agricultural Technology and Management, from Faculty of Agriculture, University of Peradeniya and Masters in Business Administration from Faculty of Graduate Studies, University of Kelaniya. Immediately after graduation she was appointed as Temporary Lecturer of the Department of Agricultural Extension, University of Peradeniya. In addition she has worked as Part time Academic Sub warden in Girls's Hostel, Mahailuppallama Sub campus, Faculty of Agriculture.



Retirements



Swarna Dissanayake

After 37 years of service, Ms. Swarna Dissanayake, Senior Staff Management Assistant, retired from PGIA. She has provided excellent service with dedication to the PGIA since joining in 1985. She performed an excellent job managing student issues and requests at the institute and following them up for Board of Studies sessions. She has been a dedicated person who was enriched with positive attitude and pleasing manner. PGIA wishes a happy retirement and thank her for the great service rendered to the institute for more than three decades.

Lumbini Samarasinghe

Mr. D.G.L. Samarasinghe, a Library Attendant (special grade) retired from PGIA after serving the institute for 37 years. Since joining the library at Faculty of Agriculture, in 1985, he has rendered valuable service for the University. PGIA wishes a him a happy retirement.



New Appointments to the Teaching Panel

Board of Study in Agricultural Biology

Dr. H.M.S. Wasana

Dr. S.S.D.H.L.S. Siriwardana

Board of Study in Agricultural Economics

Prof. P. Athukorala

Board of Study in Agricultural Extension

Dr. S.M.C.B. Karalliyadda

Dr. M.C. Rasmin

Board of Study in Agricultural Engineering

Dr. G.M.P. Kumara

Dr. R.M.K. Kumarihamy

Dr. N.G.P.B. Neluwala

Board of Study in Animal Science

Dr. E.T.S. Madhubhasini

Dr. S.S.D.H.L.S. Siriwardana

Dr. S.S.S. de Silva Jagoda

Dr. R.M.S.B.K. Ranasinghe

Dr. N.L.B.R. Liyanage

Dr. H.M.S. Wasana

Dr. P. Weththasinghe

Board of Study in Crop Science

Dr. L.V.Y. Weerarathne

Board of Study in Plant Protection

Dr. P.A.I.U. Hemachandra

Dr. W.H. Jayasinghe





M.M.J.G.C.N. Jayasiri

Ph.D.

B/S in Agricultural Engineering

Senior Supervisor:

Prof. N.D.K. Dayawansa

ASSESSING ENVIRONMENTAL SUSTAINABILITY OF THE RICE BASED AGRO-FOOD SYSTEM IN DEDURU OYA RIVER BASIN OF SRI LANKA

Well managed agro-food systems play a central role in achieving sustainable development goals as they provide financial benefits while ensuring food security with less or no harm to the natural environment. Accordingly, a study was carried out to assess the sustainability of the rice based agro-food systems within the contexts of non-point source pollution due to agriculture and its impacts, sustainable agronomic practices, and field level water governance. The study was carried out in the Deduru Oya river basin, focusing on the basin scale.

Total 39 agricultural pollutants were tested in the basin and this is the known first study in Sri Lanka that discovered agricultural pesticide residues in natural waters; all the detected pesticides were above thresholds. The temporal variation of pollutants was prominent over spatial. The analysis revealed that there were common malpractices in pesticide application such as over application and usage of insecticides that are not recommended for rice. Therefore, fish, amphibians, insects, and beetles are at risk from the exposure to certain pesticides. Considering the potential unsuitability,

agronomic and governance solutions were discovered. There is a need of improvements in nutrient, water and pesticide management practices over both intra and inter topo sequences as well as social sustainable aspects. As the primary field level water manager, the farmer organization's organizational behaviors are lacking in organizational culture (financial accountability), legitimacy and organizational stability. Pesticides are considered to be the highest environmental risk causing agricultural pollutant, hence a policy solution was suggested to minimize pesticide risk.



S.M.M.Samarakoon

Ph.D.

B/S in Agricultural Economics

Senior Supervisor:

Prof. H.L.J. Weerawansa

ASSESSING RESOURCE USE EFFICIENCY FOR ENHANCING PRODUCTIVITY IN COCONUT PLANTATIONS IN SRI LANKA

The stagnant nature of national coconut production in Sri Lanka indicates some unrevealed areas of coconut sector development which had been identified as Total Factor Productivity (TFP) growth. Therefore, this study was designed to estimate the TFP growth of the Sri Lankan coconut sector from 1985 to 2019 which recorded a negative TFP growth during the entire period. TFP growth can be improved through Technical Efficiency (TE) and technological progress. Accordingly, the TE of coconut plantations belonging to Kurunegala Plantations Limited was estimated, and found that the mean TE of coconut plantations was 87%, which indicates the scope for increasing the output by 13% without increasing the input levels. Inorganic fertilizer, rainfall, agrochemicals, and mulching reported positive and significant effects in improving production, while labor usage had negative and significant effects. Quantile Regression (QR) approach used to estimate a coconut production function and found that labor, agrochemical usage, number of bearing palms, and rainfall have positive and significant effects on coconut production and applying fertilizer, irrigation, and agrochemicals to the coconut plantations on a higher level of production was more effective. To improve the resource use efficiency, financial and economic viability and risk resiliency were estimated for 15 Coconut Based Agroforestry Systems (CBAS) and found that all CBAS proved to be economically viable. This study concluded that there is an opportunity to apply the inputs at different production levels to improve the resource use efficiency in coconut production and there is huge potential for diversifying the existing monoculture coconut plantations to generate financial and economic benefits.



A.J. Fernando

Ph.D.

B/S in Agricultural Engineering

Senior Supervisor:

Prof. K.S.P. Amaratunga

OPTIMIZATION OF HEAT PUMP DRYING BY REAL TIME CONTROL OF AIR FLOW THROUGH CASCADE EVAPORATORS AND PARALLEL FLOW

Heat pump (HP) drying technology has been widely used in the food industry. However, challenges in optimizing the HP drying system are significant drawbacks in operationalizing the technology. Therefore, the objective of the research was to optimize the HP drying process by maximizing the condensate by altering the design configuration and process parameters. The psychrometric, energy, mass balance, and empirical equations for refrigeration were used to develop algorithms and models for real-time control of the process and design parameters. Python, an object-oriented, high-level programming language, has executed the developed models. Initially, a single evaporator and single condenser HP drying system was developed and tested with coffee beans. Then a cascade evaporator parallel flow condenser HP drying system was developed to optimize the design configuration. In conclusion, the operation of the HP drying system should be altered to maximize the water condensate for the given input energy. This can be achieved by proper control over the air flow rate and air flow configuration based on the real-time input air temperature and relative humidity.





D.S. Kekulandara
Ph.D.
B/S in Crop Science
Senior Supervisor:
Prof. L.D.B. Suriyagoda

EVALUATION OF SELECTED SRI LANKAN RICE VARIETIES FOR PHOSPHORUS (P) UPTAKE AND USE-EFFICIENCY, IDENTIFICATION OF THE PRESENCE OF PUP1 QTL AND DEVELOPMENT OF P DEFICIENCY TOLERANT RICE VARIETIES THROUGH DNA MARKER ASSISTED SELECTION

The cost of production of rice is mainly determined by the amount of fertilizer applied externally. Phosphorus (P) fertilizer is a limiting factor in rice productivity. This study was conducted to find solutions for reducing P fertilizer application in rice cultivation. The best performing varieties in low P fertility were identified through continuous field testing of 44 local Sri Lankan rice varieties at low fertile soil and in hydroponic system as well. Mainly varieties of long maturity age group showed tolerance in P deficient conditions while Bg94-1, At353 and Bg300 medium and short age varieties too performed well. Identifying genetics behind the tolerance for P deficiency, presence of major gene responsible for P starvation tolerance, PSTOL1 in 48 local rice varieties were studied. The expression of the PSTOL1 gene was also studied for selected rice varieties. Amazingly, more than 80% of Sri Lankan local rice varieties possessed the PSTOL1 gene and showed that there is no clear relationship between P deficiency levels and either the presence of PSTOL1 gene or its expression in tested rice varieties.

Thus, some varieties with PSTOL1 gene, were not tolerant to P deficiency while the gene absent varieties such as At353 and Bw400 performed well under low P condition. However, hybridizing the best performing varieties having different P use efficiency related traits, ten promising lines were developed for high yield and P deficiency tolerance.



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Ph.D.
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SPECIES REPLACEMENT OF WHITE-EYES (PASSERIFORMES: ZOSTEROPIDAE) ALONG AN ALTITUDINAL GRADIENT

Species generally have a restricted distribution where any given species is replaced by a closely related species at the edge of their range. The overall aim of this study was to investigate how Sri Lanka white-eye (*Zosterops ceylonensis*) (SLWE) has replaced Oriental white-eye (*Z. palpebrosus*) (OWE) at upper elevations in Sri Lanka. The first objective was to document densities of the two species in sympatry and allopatry. There was a marked decline in the density of OWE in sympatric zone, while SLWE densities did not show such a change. Habitat differences in sympatric and allopatric zones were investigated under the second objective. Results showed that there was a clear change in vegetation with increasing elevation, where canopy height and tree density decreased, and foliage height diversity increased. The third objective was to document differences in morphological characters like bill length, bill width, tarsus length, and wing length, between allopatric and sympatric zones. The sympatric SLWE had increased bill length and width, enabling it to be ecologically isolated from smaller OWE, facilitating coexistence. The fourth objective targeted niche breadth and overlap of the two species to study how they partitioned the use of habitat in sympatry. Results confirmed that niche breadth of sympatric OWE decreased, demonstrating some competitive pressure from larger SLWE. Overall, replacement of OWE at higher elevations with slightly larger SLWE may be said to have taken place due to a combination of reasons, viz. differences in densities, habitat differences, morphological characteristics, and changes in niche breadth and overlap.



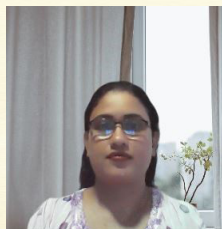
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CHARACTERIZATION AND SELECTION OF CLIMATE-RESILIENT FARMING SYSTEMS IN THE MOUNTAIN AREAS OF SOUTH ASIA

Farming System Units (FSUs) located at an elevation ≥ 300 mamsl and a slope of $\geq 30\%$ in Sri Lanka (Hatton and Welimada), Bangladesh (Chittagong), and Nepal (Jhikhu Khola) were compared to assess the level of resilience and characterization of diverse farming systems in mountainous areas in South Asia. To assess the level of vulnerability, adaptability and resilience of the farming systems five indices, namely, Climate Vulnerability Index, Social Vulnerability Index, Food Nutrition and Health Vulnerability Index, Adaptability Index and the Climate Resilience Index (CRI) were developed and mapped for spatial distribution of each index. A questionnaire survey helped recognizing different farming systems and their components. Chittagong had the highest CVI, FNHVI and SVI while Hatton had the lowest CVI and lowest SVI. Jhikhu Khola had the lowest FNHVI. The climate change adaptability and climate resilience was highest in Hatton while Chittagong had the lowest adaptability and climate resilience. Identification of good adaptation strategies and best farming practices adopted by the

farmers to cope up with climate change challenges and implementing those in vulnerable farming systems would help build climate-resilience in mountain ecosystems of South Asia while improving food and nutrition security, social well-being and environmental sustainability.





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IDENTIFICATION OF GROWTH STAGE SPECIFIC NITROGEN AND POTASSIUM RANGES FOR TOMATO GROWN IN SOILLESS CULTURE

Over application of nitrogen and potassium fertilizers are commonplace in soilless culture in many regions of the world. Indiscriminate use of soluble fertilizer in hydroponics, affects yield and quality of tomato (*Solanum lycopersicum* L.) and over use of fertilizer could contribute to environmental pollution. As a step towards investigating this situation, a series of experiments were conducted, starting with a farmer survey, followed by three fertigation trials. Field studies were conducted to determine the critical nitrogen (N) and potassium (K) application rates with tissue concentrations and carry over effect, at growth stages of hydroponically grown tomato under tropical, semi-intensive, greenhouse conditions. The critical N application rates for vegetative, early, middle and late reproductive stages of hydroponics tomato were 10, 50, 90 and 140 mg/plant/day, while the corresponding tissue N concentrations were 4.7-5, 3.5, 3.8-4 and 4.3% respectively. The critical K rates were 50, 200, 300 and 350 mg/plant/day and the corresponding tissue K concentrations were as, 2.5, 2.1-2.5, 2.5 and 2.7-2.8 % respectively. The carryover effects of high rates of N and K application at the vegetative stage on subsequent growth stages were not significant in hydroponically grown tomato. These findings can be directly used for recommending suitable N and K fertilizer doses for growth stage specific fertigation schedules for greenhouse tomato in Sri Lanka and rest of the tropical region. This will enhance higher tomato yields cost effectively, sustaining the greenhouse crops sub-sector in the humid tropical region of the world, environmentally and economically.



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SCREENING OF RICE VARIETIES FOR LOW NITROGEN CONDITIONS AND DEVELOPMENT OF A SUITABLE NUTRIENT MANAGEMENT PACKAGE TO ENHANCE NITROGEN UPTAKE OF SELECTED RICE VARIETIES FOR LOW INPUT CONDITIONS AND ORGANIC FARMING

Improvement of nitrogen (N) fertilizer use efficiency is an important aspect to maintain soil fertility and environmental quality. Nitrogen Use Efficiency (NUE) of wetland rice cropping systems is less than 30% and it is known to be a key factor of low yields. The main objective of the study was to increase the NUE of selected rice varieties, which performed better under low input conditions by formulating appropriate nutrient packages along with inoculants of N fixing bacteria. Mainly, better performing traditional and improved rice varieties were screened among 15 popular traditional and improved rice varieties under low input conditions especially under organic farming. Population densities of rhizosphere bacteria of selected rice varieties were assessed under different nutrient input conditions and N fixing bacteria strains associated with selected rice varieties were isolated and identified using 16S rRNA sequencing. Under controlled condition, significant growth and yield increase was recorded by *Beijerinckia fluminensis* /*Rhizobium pusense* in *Kaluheeni* when added alone with compost, and compost + chemical fertilizer. For *Suwandal*, *Pseudomonas aeruginosa* and for Bg 358, *Rhizobium pusense* strain 68 enhanced the growth and yield when treated with compost or compost and chemical fertilizer in combination. Three inoculants led to a significant increase in plant N contents and yields of respective varieties at maximum tillering / panicle initiation stages in comparison to non-inoculated control implying that those N fixing bacteria were able to survive and fix N under field conditions with the suggestion of long term evaluation of field adoptability.



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DEVELOPMENT OF A SLOW RELEASE UREA FERTILIZER INCORPORATING RICE HUSK BIOCHAR TO IMPROVE THE NUTRIENT USE EFFICIENCY IN PADDY CULTIVATION

Urea is the most extensively utilized nitrogen (N) source in Sri Lankan rice cultivation, in which fertilizer use efficiency (FUE) is generally less than 30 %. This study developed a slow-release urea fertilizer (SRF) with rice husk biochar (RHB) in an effort to increase urea FUE in rice cultivation. Poor texture of rice husk hinders nutrients and moisture from being retained. Thus, to create high-quality biochar, rice husk was co-pyrolyzed with Eppawala rock phosphate at three different temperatures: 350 °C, 500 °C, and 650 °C (RHBP). At low temperatures ≤500 °C, co-pyrolysis enhanced porous structure and P availability at 500 °C and 650 °C. The co-pyrolyzed biochar was subsequently intercalated with urea and pelletized using two different binders (mineral and organic substances). The pellet with the greatest strength and slow-release characteristics contained 28 % N, 0.8 % P, and 0.4 % K. The effect of SRF on rice growth, N uptake, and FUE was examined in a field experiment. Field treatments included zero N, 100% and 75% N as urea, 75% and 50% N as SRF in four applications, and 75% N as SRF in three applications. A yield and total N uptake comparable to 100% N supplied as urea were achieved in the field with four applications of 75% N applied in the form of SRF. This study revealed that the slow-releasing characteristic of N applied as SRF pellets has the potential to lower the amount of urea used in rice production by 25–50%.





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DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF A ROTARY DRUM ABRASION PEELING MACHINE FOR SPHEROIDAL FRUITS AND VEGETABLES

In the early stages of food processing, fruit and vegetable peeling is a key unit operation. Micro, Small, and Medium Enterprises (MSMEs) prefer mechanical peeling, despite the lack of highly effective peelers, to minimize their cost of production. Naturally, most of the fruits and vegetables used for processing are spheroidal in shape. Consequently, the purpose of this research was to develop a continuous rotary abrasion peeling machine for spheroidal soft and thin skin fruits and vegetables. The machine has a power source, frame, and separate mechanisms for feeding, abrasion peeling, washing, and collecting foods, which make it easier to peel and clean raw foods during mechanical peeling. After fabricating the machine, a series of performance tests were carried out using potato (Granola variety) and Ambarella (Large and Miniature fruit types). In the performance evaluation, the appropriate horizontal drum angle was determined to be 10° for mechanical peeling of potato and Ambarella. The peeling capacity of potato in machine peeling was 98.75 kg h^{-1} and it was 15-fold greater than manual peeling. Moreover, the new peeling machine showed 103 kg h^{-1} of capacity for Ambarella which was 22-fold higher actual peeling capacity in comparison to knife peeling. The labour requirements for machine peeling potatoes and Ambarella were 15 and 19 times lower, respectively, than those for manual peeling. Based on the machine capacity, it is appropriate for MSMEs. However, further improvements are needed to enhance the Ambarella peeling efficiency and the machine should be tested for other spheroidal shape fruits and vegetables as well.



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STUDY ON THE OCCURANCE OF HEAVY METALS IN SURFACE WATER BODIES DUE TO THE USE OF AGROCHEMICALS IN RICE CULTIVATION IN TRINCOMALEE DISTRICT

Nonpoint source pollution from agricultural runoff threatens water bodies, posing a serious danger to drinking water resources and aquatic ecosystems. It has been reported that many agricultural chemicals contain toxic trace elements. Further, usage of agrochemicals is much debated due to the rapid increase in CKDu in agricultural areas of Sri Lanka. This study was conducted to assess the practices of pesticide usage in rice cultivation and to assess the occurrence of heavy metals in surface water bodies due to agrochemicals in rice cultivation areas in the Trincomalee district. The study revealed that WHO hazard classes Ia and Ib, which are prohibited in the country, were not used in the study area, but 63% of pesticides used belong to class II (moderately hazardous) category, which is not highly recommended by FAO. In addition, poor agricultural practices, such as violations of scientific recommendations ($>50\%$), not using protective gears when applying pesticides (63%), poor control of dumping empty pesticide containers ($>80\%$), drinking water without checking the quality (55%) were observed among the study population. Further, the observed heavy metal (As, Cd, Pb, Cu, Zn) concentrations in surface water bodies were far below the permissible levels for irrigation water, ambient water and drinking water quality. This may be due to the restrictions of toxic pesticides in the country in recent years. In this regard, it is necessary to create public awareness of the hazards of agrochemicals. Further, farmers should also be encouraged to practice organic agriculture and integrated pest management, which will help to promote sustainable development. In addition, continuous research is required to fully comprehend the behaviour of agrochemicals in water bodies.



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APPLICABILITY OF CLAY BRICK AND LATERITE BRICK AS ENVIRONMENTAL FRIENDLY AND EFFECTIVE ADSORBENTS TO TREAT CADMIUM (II) AND LEAD (II) IN AQUEOUS SOLUTION

The discharge of enormous amounts of heavy metal into the natural environment due to population growth, industrial development, rapid urbanization, energy usage, and waste generation from domestic and industrial sources has resulted in severe issues around the world. Pb^{2+} and Cd^{2+} are considered more toxic heavy metals to human health. Conventional treatment methods are extremely expensive due to their high initial cost, operation and maintenance cost. Hence, there is a superior necessity for efficient technologies for the treatment of heavy metal contaminated wastewaters. Adsorption has been discovered to be a crucial component in eliminating harmful contaminants from wastewater which is the most commonly used method for removing harmful metal ions from wastewater. CDW materials are commonly used as low-cost adsorbents to treat heavy metals in industrial wastewater. CDW material is seriously effect to the Sri Lankan construction industry. Wastage of materials in most construction sites in Sri Lanka is beyond acceptable limits. Hence, CDW waste needs to be managed in a systematic way. Therefore, great attention is paid to manage CDW waste to reduce adverse impacts such as environmental pollution, issues in social and economic aspects. Thus, applicability of CDW waste as low cost adsorbents to treat heavy metals in wastewater is a major factor for added value for CDW in Sri Lanka. Hence, this study focuses on the applicability of clay brick and laterite brick as effective and environment-friendly adsorbents to treat Cadmium as Cd^{2+} and Lead as Pb^{2+} in aqueous solution.





UNDERSTANDING THE SYSTEM PRODUCTIVITY DURING THE TRANSITION PERIOD FROM CONVENTIONAL TO ORGANIC NUTRIENT MANAGEMENT SYSTEMS UNDER DIVERSE RICE-BASED CROP ROTATIONS IN THE DRY ZONE (DL1B) OF SRI LANKA

Dependency on mineral fertilizers has jeopardized the environmental sustainability as well as the economic sovereignty of the country with a cascade of negative consequences from early introduction of mineral fertilizers till date. Solutions were suggested through shifting towards alternative nutrient management approaches, which are extending to judicious nutrient substitution systems to complete organic systems. These alternative systems cannot be sustained without an integrated strategic planning and designing of appropriate cropping systems especially during the transition period. Transition period is the time of converting a system from one to another, with respective of nutrient management systems, from conventional to organic. Depleting soil reserves of nutrient elements and weeds are substantial bottlenecks in optimizing yield and system productivity at the time of the transition. This research fundamentally targets

to assess the system productivity changes by integrating crop rotation (Mono-cropped rice; LOW, rice-sunn hemp-rice; MEDIUM, rice-maize rotation; HIGH and rice-sunn hemp-maize; VERY HIGH) and nutrient management systems (conventional; CONV, integrated; INT, and organic; ORG) on rice-based cropping systems during first two years of transition of conventional to organic in the dry zone of Sri Lanka. After five seasons, ORG and INT nutrient management delivered a yield of 4.1–4.2 Mg ha⁻¹season⁻¹, which was similar to the yield of conventional system. The interaction of INT and ORG nutrient management resulted positive synergy with all crop rotations by yielding similar to the expected in short-term and further is expected to deliver the same in long-term application too. Weed density and biomass were reduced with long-term high crop rotation diversification with all different nutrient managements. Therefore, high crop rotation intensity is the most suitable and possible method of weed control by an organic farming method with the improvement of productivity within two years of the transition period.

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ASSESSING MARKET POWER OF RICE MILLING INDUSTRY IN SRI LANKA: AN APPLICATION OF NEIO APPROACH

Examining the market power of an industry is essential to ensure the effective functioning of an economy in a country. In Sri Lanka, rice is the most consumed staple food. The rice milling industry serves as an important link in converting paddy into rice in this country, which is integral in supplying rice to the nation in terms of quantity and quality. There is an argument in the country that, the market structure of the rice milling industry is non-competitive and used the market power to set the rice price above its marginal cost. In this setting, the present study used the New Empirical Industrial Organization (NEIO) approach to ensure the presence of market power in the rice milling industry in Sri Lanka and observed its annual trend. Further, the factors influencing the market power of the rice milling industry were also investigated. Further, the study estimated the Lerner Index (LI), own-price, cross-price, and income elasticity of demand for locally produced rice. Finally, the social welfare loss due to rice miller's market power was calculated. The annual data from 1982 to 2019

were collected from HARTI, DCS, CBSL, CEB, CEYPETCO, DOA, PMB, and The World Bank. The miller's pricing and demand models were estimated using the non-linear seemingly unrelated regression technique. The estimated conjectural variation (CV) elasticities and the LI of the Sri Lankan rice milling industry were 0.348 and 0.677 respectively and the results were significantly ($p < 0.05$) different from zero and one. This depicts that the rice milling market structure was neither perfectly competitive nor monopoly market power. Further, the rice milling industry exerted a significant oligopoly power in setting the price of rice above its marginal cost. This miller's power was significantly ($p < 0.05$) reduced by the implementation of the Government Ceiling Price on rice (GCP = -0.06) during the study period. The rice miller's price was significantly ($p < 0.05$) and positively influenced by the farm-gate price of paddy (1.22), industrial wage rate (0.51), and industrial electricity charge per unit (0.87). This study recommends that government could use GCP policies to control the market power of the rice milling industry. The formation of antitrust laws to keep a competitive market structure to equalise the price of rice to marginal cost is required. Unavailability of data on rice market concentration limited testing of the influence of the same on its market power. It is recommended to regularly collect and disseminate information on the structure, conduct and performance of the markets to ascertain the existence of market power.

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SUSTAINABILITY OF HORIVILA – PALUGASWEWA CASCADE SYSTEM: AN INDEX BASED ASSESSMENT

Traditional Village Tank Cascade systems (VTCs) present in the dry zone of Sri Lanka are sustainable irrigation systems from the ancient times. Over the centuries, these systems have well integrated into the nature and are functioning as important ecosystems. However, these ecosystems are facing various threats due to population growth, climate variability and land use/ land cover changes. Assessment of the sustainability of these systems helps in identifying the existing threats and will be beneficial in providing their services to the future generations. Within this background, this study was undertaken to assess the rainfall variability in terms of climatic extremes, to determine the land use/land cover changes and associated hydrological impacts and to assess the sustainability of VTCs/ individual village tanks by deriving an index considering technical, socio-economic and environmental factor. This study was conducted in Horivila - Palugaswewa cascade system located in Anuradhapura, Sri Lanka. The results of the rainfall assessment revealed that there are extreme rainfall events occur in some seasons through there was no change in the annual rainfall pattern in the study area. The current land use and land cover condition supports in improving the hydrology of this cascade system. The application of the sustainability index to the Horivila - Palugaswewa cascade system revealed that there is a necessity to improve socio-economic factors to maintain the sustainability if there are no serious climate change impacts and land use/ land cover changes.



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CHARACTERIZING THE PROBIOTIC PROPERTIES OF MICROORGANISMS ISOLATED IN IDLI BATTER AND THEIR EFFECTS ON BATTER DURING FERMENTATION

Idli is a common flour based fermented food prepared using lactic acid bacteria. The objective of the present study was to isolate and characterize lactic acid bacteria from *idli* batter, identify the biochemical during fermentation, its effects on sensory quality of steamed *idli* and to determine the probiotic properties of isolates. Ten isolates (I: 1-10) were identified based on their colony morphology and biochemical characteristics. Based on results, it confirmed up to the genus level that all strains belong to lactic acid bacteria. All isolates showed their ability to grow at pH 2 and 8 and were able to survive at 0.3% bile salt. However, in some isolates their viabilities decreased with time. I-1, I-7 and I-10 were with better pH tolerance ability when compared to other strains in harsh pH condition. All isolates were susceptible to more than two antibiotics. On the basis of zone of inhibition shown by isolates against the three pathogenic organisms tested, the overall zone of inhibition diameter of isolates fell within range from 7.3 ± 1.53 to 16.3 ± 0.58 mm. All isolates exhibited γ -hemolysis. In case of auto aggregation activity and hydrophobicity, isolates I-2 and I-3 showed the highest cell auto aggregation and I-8 showed moderate hydrophobic behavior compared to other isolates. Also, it was noted that pH dropped steadily from 6.28 to 3.72 while titratable acidity increased from 0.24 to 0.92% during the fermentation period. With fermentation, the count increased. *Idli* prepared from *idli* batter after 8-12 h of fermentation scored maximum for the sensory quality.



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STUDY OF FACTORS INFLUENCING THE BEHAVIOURAL INTENTION OF USING MOBILE BANKING

This study aimed to identify factors influencing the behavioural intention of using mobile banking among bank customers in Sri Lanka. An additional objective of this study was to compare the proposed model with the major theoretical models contributing to its formulation. The population of this study was bank customers who use a smartphone or similar portable smart device, and the sample was 913 individuals selected by employing convenience sampling technique. An online distributed structured questionnaire was used in data collection and the main analysis was conducted by applying covariance-based structural equation modeling. The results revealed that attitudes towards mobile banking has a significant direct influence on behavioural intention of using mobile banking followed by trust and relative advantage, respectively. Additionally, perceived ease of use reported the highest indirect effect on behavioural intention of using mobile banking followed by awareness and perceived usefulness. The results of the model comparison showed that although all three models exposed a significant potential to explain the behavioural intention to use mobile banking, the theory of planned behaviour was superior in explaining the variance of behavioural intention to use mobile banking and the proposed model was slightly better than the technology acceptance model. The outcome of this study is important to a variety of stakeholders such as banking service providers, prospective researchers and relevant authorities, as well as the findings can be used to provide an excellent service to bank customers.





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MODELLING TRENDS, FITTING BEST-FIT PROBABILITY DISTRIBUTIONS AND ANALYSIS OF SHIFTS IN MONTHLY RAINFALL DISTRIBUTIONS OF EASTERN AND NORTH-WESTERN PROVINCES, SRI LANKA

This study was carried out to fulfill the timely need of in-depth analysis of rainfall in coastal areas, especially focusing on rainfall of North-Western and Eastern coastal lines of Sri Lanka. The rainfall data for a period of 30 years (1986–2016) at 19 stations were used to study on the long-term trends, shifts and fitting probability distributions to monthly rainfall data. Mann Kendall test, Sen's slope estimator, sequential Mann Kendall tests, one sample Student's t-test, ANOVA and Kruskal Wallis were the statistical methods used to test changes. There were monotonic upward and downward trends for annual (6/19 stations), monthly (7/19 stations) and seasonal (7/19 stations) rainfall patterns indicating that climate change effect is location specific. Johnson SB was the best-fit distributions in stations of North-western province and Gen. Pareto, Generalized Extreme Value distribution and Frechet (3P) were the best-fitted distributions for Eastern province. T-test results showed that all the stations have received a sufficient average annual rainfall for all the considered stations. ANOVA and Kruskal-Wallis test results suggested that there was a significant difference in average annual amounts of rainfall between the time periods 1987-1996, 1997-2006 and 2007-2016 only for the Kantale station. The bar chart plots of monthly rainfall data in North-western province showed the general bi-modal rainfall pattern prevailing in Sri Lanka clearly than in Eastern province. Accordingly, site/location specific detailed analysis is recommended rather than taking generalized policy decisions in developing climate sensitive industries in the Eastern & North-western coastal lines.



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ENERGY EFFICIENCY AND ECONOMIC ANALYSIS OF AN IRRIGATED RICE FARMING SYSTEM IN AMPARA DISTRICT OF SRI LANKA: AN ASSESSMENT FOR 2018/19 MAHA SEASON

This research presents the outcome of energy use efficiency and economic analysis of irrigated rice farming systems in the Ampara district, during the 2018/19 Maha season, which will be useful for the farmers and decision-makers. Primary data were collected from 80 farmers covering all the major irrigation schemes of the Ampara district by using a structured questionnaire. The data collected on farm input and output volumes and usage hours were converted to energy values using standard coefficients reported in the literature. Economic analysis was done based on the regional cost information collected through the same questionnaire. Labor, machinery, fuel, agrochemicals, seeds, and irrigation water were recognized as farm inputs, while rice yield and straw were considered as outputs. The total energy input and total energy output of rice production were 29,689 MJ/ha and 154,681 MJ/ha, respectively. The highest energy input was accounted by nitrogen fertilizer (44.76%). The system energy efficiency was 5.3 with a water productivity of 0.8 kg/m³. The share of non-renewable energy (67.29%) which was higher than the renewable. The average value of the total cost of production per hectare, gross return per hectare, benefit-cost ratio, and productivity of rice production were to be Rs. 134,540.64, Rs. 212,316.36, 1.58 and 0.04 kg/Rs, respectively. The unit cost of production was Rs. 23.45 /kg. Although the economic value of major inputs of materials (33.48%), labor (31.59%), and power (34.95%) equally contribute to the cost of production, the shares of these three major inputs in terms of energy were 58.32%, 1.50%, and 16.24%, respectively. The energy analysis is a convenient tool to quantify the efficiency of different rice farming systems overcoming the issues that arise from monetary escalations across time and regional boundaries in economic efficiency analysis.



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A STUDY OF ENTREPRENEURIAL DECISION – MAKING APPROACHES OF AWARD – WINNING WOMEN BUSINESS OPERATORS IN KANDY DISTRICT OF SRI LANKA

Women's entrepreneurship has been widely identified as a driver of economic and social development worldwide. However, literature in women entrepreneurship argues that women lag behind men in the SME sector, and women business operators are constrained. Some women business operators become more successful than others, even in a constrained environment. Therefore, this research aims to study the entrepreneurial decision-making approaches of award-winning women business operators in the Kandy district of Sri Lanka using theoretical lenses of Effectuation, Causation and bricolage. A qualitative multiple case study design was adopted to achieve research objectives. The study sample was selected from the successful women business operators who have been awarded in "Star Awards" from 2014 to 2019. A purposive sampling method was used and sampling was continued up to 30 cases. The data were gathered through face to face interviews using a pre-determined interview topic guide. The data analysis was carried out in three simultaneous stages: within-case analysis, cross-case analysis and comparison of findings with the theory. The findings revealed that both the service and manufacturing sector award-winning women business operators had adopted a similar entrepreneurial decision-making approach in their entrepreneurship process.

Also, findings show that they had practised effectuation principles of 'Birds in hand, Affordable loss, crazy quilt, Lemonade and pilot in the plane' in the entrepreneurship process. However, the practice of the lemonade effectuation principle was found among a fewer number of respondents compared to the other four principles. Also, the findings illustrate that these women business operators have used the 'Bricolage' approach in the form of 'selective bricolage'. They have used it as a one-off practice to find solutions for problems and opportunities they faced in their businesses. As a result, they have become more effectual when starting their initial business and have combined the causation approach with effectuation when they grow their businesses.



WaPOR Data Analysis and Use

The FAO Water Productivity Open-access portal (WaPOR) uses remote sensing technologies to monitor and report on agricultural water productivity. PGIA implemented a FAO funded project through the Board of Study in Agricultural Engineering on 'WaPOR field data collection in the Malwathu Oya West Sub Catchment of Malwathu Oya River Basin (Nachchaduwa-Anuradhapura), Anuradhapura District, Sri Lanka. A four day residential workshop was organized through the project on "WaPOR data analysis and use" primarily for a selected group of postgraduate students of the PGIA. The total number of participants was 17 and the workshop was conducted during 28-31 March, 2022 at the PGIA. The workshop consisted of introductory theory and practical sessions on remote sensing, GIS, WaPOR data collection, analysis and use. The resource persons of the workshop consisted of 3 academic staff members from University of Peradeniya and 3 engineers from Irrigation Department, Colombo.



Pre-Congress Workshops

1. Data Analysis Using SAS

The workshop on data analysis using SAS was held on the 3rd and 4th of June 2022 for the theory session and the 10th and 11th of June 2022, for the practical session. The workshop was organized by the Congress organizing committee of PGIA and coordinated by Dr. L.M. Rankoth. It was conducted online with 30 participants, which included PGIA students, academics, and researchers. The workshop covered the areas of experimental designs important for research, introduction and practical session on data analysis using Statistical Analysis Software (SAS). The organizing committee provided advice and support for the analysis of participants' own research data under the supervision of an expert panel. The resource persons for the workshop were Prof. T. Sivananthawerl and Prof. B.M.L.D.B. Suriyagoda.



2. Narrating a Story with Complex Data: tips for presenting research data

The second pre congress workshop on Narrate a Story with Complex Data: tips for presenting research data was successfully concluded with 27 participants on June 23, 2022. The workshop was coordinated by Ms. Nishadi Liyanage, while Prof. Pradeepa C. G. Bandaranayaka contributed as the resource person. The session covered the following subjects that are critical for research students when they are developing a story for their manuscripts: Which data to present in your manuscript? How to present? Quality figure formatting, Data tabulation, table and figure legends.

3. Effective Research Paper Writing

The third pre-congress workshop on Effective research paper writing was held on August 20, 2022. A total of 63 students participated in the session online, including 25 undergraduate and 38 postgraduate students. The workshop covered types of research writing, writing an effective abstract, writing a good research paper, types of journal, submission and review processes, and more. Prof. Meththika Withanage contributed as the resource person. Dr. Pabodha Weththasinghe coordinated the workshop.

4. Effective Research Presentation Skills

The ability to deliver an effective and engaging presentation is an essential skill for researchers. Hence the fourth pre-congress workshop was conducted on Effective research presentation skills on November 2, 2022. The workshop was conducted online and 37 participants attended. Prof. Chalinda Beneragama, Dr. Rangeeka Perera and Dr. Panduka Neluwala contributed as resource persons. They covered three sessions on Knowing the basics of communication skills for your presentation, Attracting the audience with your slides and Presenting science online respectively. The workshop was coordinated by Dr. Nipuna Perera.

CAP-NET LANKA - PGIA ACTIVITIES

World Water Day – 2022

An educational programme was conducted on March 22, 2022 for school children to mark the World Water Day 2022. The activity was organised in collaboration with the Kotmale International Training Institute of Irrigation and Water Management (KITI-IWM), Kothmale, Sri Lanka.

Dr. A.G. Chandrapala, Principal Agriculture Scientist, Natural Resources Management Center (NRM), Department of Agriculture, Sri Lanka and Dr. Herath Manthirithilaka, former Head, Sri Lanka Development Initiative, International Water Management Institute (IWMI), Sri Lanka, made presentations on “Our contribution as children and youth to watershed management for conservation, development and food security” and “Groundwater – Making the Invisible Visible”, respectively. Altogether, 78 participants, including schoolchildren, diploma students of KITI and teachers, participated in the programme. Art, poster and essay competitions were held among the school children, and the winners were rewarded at the event. All the participants were issued a tree seedlings at the end of the programme.



Training Programs on Construction of Rain Water Harvesting Systems

Two training programmes were conducted in Badulla and Monaragala from March 3–6, 2022. The activity was organized in collaboration with the Lanka Rainwater Harvesting Forum (LRWHF), Sri Lanka. The objective was to train youths in water-scarce areas on the construction of rainwater harvesting systems and make their services readily available to the people in those areas to adopt this technology. A total of 47 youths, including 15 males and 32 females, were trained in masonry and plumbing. At the end of the program certificates were awarded to the participants.



National Symposium for Learning Exchange in Community Water Supply in Sri Lanka

Cap-Net Lanka collaborated with World Vision Lanka, Postgraduate Institute of Agriculture, Plantation Human Development Trust, Department of National Community Water Supply and Lanka Jalani in organising this symposium. The event took place on September 12, 2022 at the Sri Lanka Foundation Institute, Colombo and was attended by more than 100 Participants from relevant institutions. The symposium's objective was to provide a forum for the practitioners to share, discuss and debate on the knowledge, innovations, and best practices generated over decades of field-level experience in implementing community water supply projects in Sri Lanka. Also, it was intended to identify the knowledge gaps and discuss the key issues affecting the performance and sustainability of the projects.



Secretary to the Ministry of Water Supply, Mr. N. B. Monti Ranatunga, graced the occasion as the Chief Guest and addressed the audience. Mr. H.M.J. Herath, Director General, Department of National Community Water Supply delivered the Keynote speech on “Importance of WASH in present crisis”. Ms. Nilusha Lakmali Patabendi, WASH Specialist, UNICEF Sri Lanka, delivered a speech on SDG 6 and Climate Resilience.

There were more than 20 presentations under three thematic sessions: Sustainability of Community Managed Water Supply Schemes, Technology, Innovation and Learning from the Field, and Water Quality Water Safety and IWRM. The symposium concluded with a panel discussion on Policies and Institutional Support to Ensure the Sustainability of Community Managed Water Supply Schemes.



Training Workshop for Small Land Holders on Soil and Water Conservation

Cap-Net Lanka conducted a training programme on July 29, 2022 for small land holders on soil erosion control and water conservation through establishment of small block plantations of bamboo. This event was conducted at the Sarvodaya Conference Hall, Kandy. The leading partner of the programme was Research for Development Innovations Alliance Lanka (ReDI), Polgasowita, Sri Lanka, a non-governmental organization. Twenty-two participants aged 18 – 28 from the Kandy area attended the programme.



Cap-Net Lanka Launched its Revamped Website, www.capnetlanka.lk

Cap-Net Lanka's Core-Group (the decision-making body) met at the Postgraduate Institute of Agriculture (PGIA) on November 29, 2022. Eleven members, including the Director, Postgraduate Institute of Agriculture attended the meeting.

At this meeting the revamped website of Cap-Net Lanka (www.capnetlanka.lk) was officially launched by the Director/PGIA. This website was designed according to the guidelines of Cap-Net UNDP.



Dr. Sewwandi appointed as New Country Coordinator of Cap-Net

Dr. S. Pathmarajah served Cap-Net Lanka as Country Coordinator for six years from 2016 and completed his second term on 31 December 2022. Subsequently, Dr. Sewwandhi Chandrasekara of the Department of Agric. Engineering, Faculty of Agriculture has been selected as the new Country Coordinator for three years, from 01 January 2023 at the Core-Group (CG) Meeting of Cap-Net Lanka, held on 29 November 2022. Dr. Sewwandhi holds B.Sc. (Agriculture) and M. Phil (IWRM) degrees from the University of Peradeniya and a Ph.D. (Hydraulic Engineering) from South Korea. She will be the first lady to take up this position after 20 years since the inception of Cap-Net Lanka. The Core Group members, including the Director, PGIA, appreciated the excellent contribution made by Dr. Pathmarajah during his tenure as the Country Coordinator.



PASS LIST -MASTERS DEGREE (JANUARY TO DECEMBER 2022)

B/S in Agricultural Biology

D.M.P.K Dhanasekara

B/S in Agricultural Economics

M.U. Abeysinghe A.A.S.L. Abeynayaka
J. Senthilselvan D. Meegastanna
D. Kandeegan G.A.R. Perera
Y.M.S.T. Yapabandara

B/S in soil Science

J.A.M.H. Jayawardhane

B/S in Bio Statistics

A.M. Shafna
I.L.A.N. Darshana
A.S.G. Jayasinghe

B/S in Agricultural Extension

K.G.D.C. Dissanayake D.W.K. Madubhashini
A.G.S. Ariyaratne G.C.I. De Silva
R.G.A. Gunasekara A.M. Wickramasinghe
W.M.W.B. Wijesinghe

B/S in Animal Science

L.M.J.N.K. Disanayaka P.M.S. Jayasena
S.K.R. Kuraish S.M. Mohamed
L.S. Atapattu H.M.U.L. Herath
S.A.S. Priyashanthi

B/S in Plant Protection

J. Balasubramaniam D.M.D.M. Dissawa
B.M.G.K. Godavita B.A.T. Amalka
R.H.T.D. Ranasinghe W.A.S. Gunarathne
S.A.D. Thakshila

B/S in Agricultural Engineering

S. Sritharan H.W.R.B. Thilakarathna G. Niroash W.M.K.D.S. Warnakulasooriya
S. Karthigayini G.C.U. Kumara B.J. Manawadu M.N.S. Dayarathna
W.L.N. Wasana H.G.S.T. Karunarathna Y.M.D.L.Y. Bandara P.M.P.C. Gunathilake
S.M.D.E.. Suriyamudali M.N. Amarasiri J. Lingeswaran K.A.G.S. Weerasinghe

B/S in Food Science & Technology

D.G.D.D. Samaraweera S.N.T. Jayathilaka Y.P.Jayalath R.M.C.H. Rathnayaka
K.D.C.P. Leelarathne S. Rifasa S.K. Fazeen M.A. Sammani
W.M.D.A.S. Bandara S. Sritharan W.T.N. Madhushani H.M.I.G.A.M.K. Senarath
W.L.C.M. Gunathilaka P.R.M.K. Fernando G.N. Liyanawaduge K.A.D.D.L. Kariyapperuma
J.A.R.L. Jayathilaka D.M.C.P. Daundasekara W.T.P. Jayasiri B.W.M. G.P. Hettiarachchi
A.M.A. Pillai W.M.D.M. Panampitiya D.L.C. Dasanayaka

B/S in Business Administration

N.A.K.H.S. Nishshanka A.M. Upananda W.M.D.A.K. Wickramasinghe P.L.C.S Senevirathna
A.C.W.W.M.R. Koswatte P.H.R. Vitharana N.B.Y.K. Dharmasena R.M.G.H.N. Ratnayake
R.S. Bandara H.U.C. De Silva M.A.N Samaranayake A.P.A.N. Ambagala
A.M.L. Priyanga

B/S in Crop Science

S.M.S.K. Samarakoon Y.M.K. Kumudumli T.M.A. Mudalige E.A.P.S. Edirimanna
I.M.R.L.K. Ilankoon K.R.S.S. Gunasingha L.H.A.M. Silva P.A.K.H. Padmapala
S.P.S. Gunathilaka L.N. Mohottige H.V.S. Silva W.M.T.N. Wickramasinghe
W.C. Sanjeewani A.D.I.U. Jayawardhana L.A.S. Yapa K.M.G. Maheshika
K.M.C. Dharmasena W.B.W.M. R.C.P. Aluwihare T.V. Jayasinghe S.K.M. Sooriyaarachchi
N.K.G.K.R. Manawasinghe D.M.B.G.A.I.K. Dissanayaka

Postgraduate Diploma (January - December 2022)

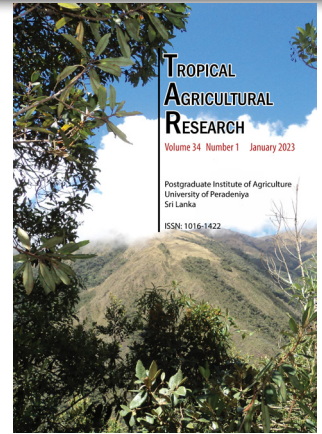
H.K.C. Dilhani R. Jansz H.M. Wedagedara L.A.D.N.L. Wijayathunge
K.G.M.N.K.K. Kappagoda S.A. Ramya S.B.I.P. Wijesooriya G.T.K.S. Perera
K.M.M.R.R.M.P. Siriwardane B.A.R. Vidushani S.K. Weerasinghe U.G.A. Somarathna
M.S.V.R. Wickrematilake H.P. Kaushalya K.G.S. Kiriwadeniya W.A.K.D. Madurangika
S.M.A.B. Samarakoon R.G.A.K. Adhikari C.P. Abeygunawardana H.L.P. Chathurangi
G.A.G. Kavindi



NEW PUBLICATIONS

Tropical Agricultural Research (TAR) Journal Volume 34 Issue (1) :2023

The above issue of TAR, the official journal of the Postgraduate Institute of Agriculture, University of Peradeniya was launched at the inaugural session of the 34th Annual Congress held on 17 November 2022. Authors can obtain the hard copy of the journal from the TAR Journal Secretariat. This is also available online (<https://tar.sljol.info/>).



SOCIAL EVENTS



Blood donation campaign organized by PASA

The Postgraduate Agriculture Students' Association (PASA) organized a blood donation campaign on October 13, 2022 at the Faculty of Agriculture, University of Peradeniya. The Blood Bank at the Teaching Hospital Peradeniya provided assistance for the event. The blood donation campaign was a success, with over 75 blood donors.



OBITUARY



It is with great sorrow that we report the untimely death of Virashmi Kodituwakkuge, the Course Coordinator of the PGIA on July 22, during a site seeing tour of the Kadugannawa hill range. She was a honors graduate in Agriculture from the University of Peradeniya.

During her tenure as the Course Coordinator, among multiple duties, the major task was the collection and compilation of news for the PGIA NEWS, which she elegantly completed as its Secretary. During this period, she was also pursued a Master's degree in Biotechnology. Unfortunately, due to her sudden passing away at very young age of 26 years, she could not accomplish any of her ambitions. The death is an inescapable destiny for all creatures, and we hope that her family and friends will have the courage understand the nature of life.

May she attain the Supreme Bliss of Nirvana.