PGIA NEWS

The Newsletter of the 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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EDITORIAL BOARD

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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.

AGRICULTURAL GROWTH IS THE KEY TO ECONOMIC DEVELOPMENT IN SRI LANKA

EDITOR'S MESSAGE

Agriculture development is heavily constrained due to several complex factors and low productivity has become the biggest challenge for the successive governments of Sri Lanka. This problem has become the biggest issue since the last decade due to multiple factors such as increasing population which now stands at 22.billion and increasing at the rate of 2. 3%. More than 70% of the Sri Lankan population depends on agriculture for their livelihoods. The agricultural sector employees about 35% of the labour force which is gradually decreasing due to lack of its consistent growth. Due to population growth agricultural land extents are getting fragmented and become uneconomic farming units. The high cost and irregular supply of farm inputs such fertilizers and pesticides have adverse effects on farming. Besides, crop losses occur due to natural disasters such as droughts and floods. The end result is the grave reductions in crop yields associated high farm gate prices and lower farm incomes. Due to these of vagaries of agricultural production youth are avoiding farming and search for more lucrative employment in other sectors, mainly in the cities.

The food availability has become highly variable among the populations depending on their purchasing power as income levels vary widely. The food availability for the low income earning rural sector is the lowest. The paradoxical situation is that while the affluent urban populations often change menus while the poorest sectors of the population are scrounging with one or two meal a day. Many Sri Lankans are deprived of the most fundamental right to sufficient food.

The relative importance of the rural agricultural sector has lost its momentum over the past two decades as crop productivity is low by all standards. Although the previously used technologies have increased productivity to some extent in crops such as rice and grains like maize, they have not kept up with the levels to match the population growth. These technologies, with the current level of productivity are outdated and does not meet the projected future population growth levels and commercial needs of industries. A remarkable technology stagnation is noticed which has been a major impediment to induce growth which has to be revitalized. Therefore, a reassessment of research & development is needed that meets the technologies required for the next several years.

Agricultural research and technological improvements are crucial to improve crop productivity and enhance returns to farmers, thereby reducing poverty and meeting future food and industry needs at reasonable prices and increase farmer incomes. Hence increased investments have to be made to modernize agricultural production sector. Accelerated investments are needed to facilitate the agricultural growth by various options. Some of these include the use of high yielding crop varieties and hybrids resistant to drought and tolerant to pests and diseases. Also the use of intensive production systems such greenhouse faming for the production of high value crops like tomatoes, strawberries, Reliable timely and reasonably priced inputs such as fertilizers and pesticides which are essential and credit needed to purchase them, an efficient training and extension service to convey timely information to the farmers. These investments have to be supported by policies which will catalyse the production chain and incentives for the management of sustainable natural resources. It has to be noted that technology development alone will not be adequate to enhance crop yields as interaction between the farmers and policy is critical.

The policy environment should be conducive and supportive of sustainable production, processing, value addition and marketing for poverty alleviation and sustainable management of natural resources.

35th PGIA Annual Congress - A Vibrant Scientific Event

The 35th Annual Congress of the PGIA was held on 17 November, 2023 at the Postgraduate Institute of Agriculture, University of Peradeniya. It 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 congress provided an opportunity for postgraduate students and young scientists to showcase their research findings to a wider audience comprised of academics, researchers, PGIA alumni and other stakeholders.

In this year, 30 oral and 8 poster presentations were made under 7 scientific sessions: Oral technical sessions includeed Nutritional and Functional Properties of Food & Feed, Agricultural Inputs for Sustainable Crop Production, Spatial Analysis & Modeling in Agriculture, Agronomic Interventions for Better Crop Production, Technological Solutions for Efficient Resource Management and Society & Information Technology in Food Systems. The poster session was on Agricultural Inputs and Services.

The inaugural session was held on 17 November 2023 with about 200 on-ground participants.

Ms. Debra Mosel, Deputy Director of USAID Mission for Sri Lanka and Maldives graced the inaugural session representing Chief Guest, Mr. Gabriel Grau, Deputy Director of USAID Mission for Sri Lanka and Maldives. Distinguished Prof. Gordon Gow, Interim Director of the Media & Technology Studies Unit of the University of Alberta, Canada, delivered the keynote speech on "Cultivating Inclusive Pathways: Shaping the Future of Digital Agriculture Research and Development". Prof. Wayne Ganpat, Professor, Faculty of Food and Agriculture, University of West Indies and Dr. Gothamie Weerakoon, Senior Curator of Lichens and Slime Molds, Natural History Museum, London delivered invited speeches. Prof. Warshi Dandeniya, Congress coordinator and Mr. Ishan Nawarathna, President of the Postgraduate Student Association (PASA) also addressed the inaugural session. Several other dignitaries including Prof. M.D. Lamawansa, Vice Chancellor, University of Peradeniya, Professor Shamala Kumar, Acting 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 of scientific findings by young 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. S.M.M. Samarakoon, Chief Executive Officer, Kurunegala Plantations Ltd delivered the Distinguished Alumnus speech at the closing session of the Congress.

Best Presenters and Awardees in the Technical and Poster Sessions

Oral Presentations

Technical Session	Title of the Paper	Presenter
Nutrintional and functional properties of food and feed	Comparative analysis of green and brown morphotypes of *Kappaphycus alvarezii* doty (Doty): morphology, total phenol content, antioxidant activity and antimicrobial activity against selected bacterial strains	G.D.S.P Rajapaksha
Agricultural inputs for sustainable crop production	Effects of biochar based slow-release fertilizer application on ammonia volatilization in lowland rice soil under two water regimes	M.K.N.W Jayarathna
Spatial analysis and modeling in agriculture	Allometric models for estimating above- ground, below-ground and total biomass of tea (*Camellia sinensis* (l.) O. Kuntze) plant individuals grown under tea cultivation systems of Sri Lanka	R.A.A.S Rathnayaka
Agronomic interventions for better crop production	Predicting salinity tolerance of popular Sri Lankan rice varieties based on root morphology at the seedling stage	K.I.S Thamali
Technological solutions for efficient resource management	Use of drone imagery to predict leaf nitrogen content of sugarcane	U.W.L.M Kumarasiri
Society and information technology in food systems	Technical efficiency in European union food industry: a stochastic frontier approach	R.M.H.V Rajapaksha

Overall Best Presenter

G.D.S.P Rajapaksha

Title : Comparative Analysis of Green and Brown Morphotypes of *Kappaphycus alvarezii* doty (Doty): Morphology, Total Phenol Content, Antioxidant Activity and Antimicrobial Activity Against Selected Bacterial Strains

Poster Presentation

Poster Session	Title of the Paper	Presenter
Agricultural inputs and services	Anti-fungal phytochemical analysis of selected Sri Lankan medicinal plants	A.N. Thissera

Awards

Dr. A. W. R. Joachim Memorial Award

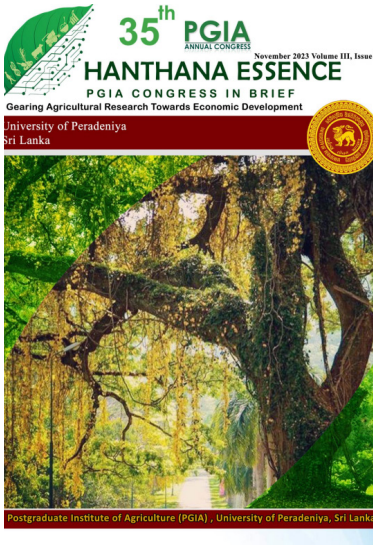
This award is presented to the student who earned the highest GPA in each academic year.
Ms. C.P. Aluwihare from the Board of Study Crop Science and Mr. G. Niroash from the Board of Study Agricultural Engineering shared this award for the year 2023.

PGIA Alumni Award

Winner - K.I.S. Thamali
1st Runner up - R.A.A.S. Rathnayaka
2nd Runner up - U.W.L.M. Kumarasiri

"Hanthana Essence - PGIA Congress in Brief"

Winner	Effects of wheat flour replacement with pumpkin powder on physical and sensory properties of biscuits	K.A.T.K. Jayalath
!st Runner up	The hidden wonder of the seaweed colour	G.D.S.P. Rajapaksha
2nd Runner up	Antioxidant, anti-daibetic, and anti-inflammatory activities of *Passiflora foeitda* grown in Sri Lanka	P.G.N.H. Dharmasiri



Academic News

Admissions for the Academic Year 2023

Applications for the academic year 2023 were called, and more than 717 applications have been received for both Peradeniya and Colombo intakes. The academic year 2023 began at the Peradeniya branch on July 22, 2023, and at the Colombo branch on February 17, 2024. Altogether 282 students were registered as regular students including 254 at Peradeniya while 28 students were registered for Colombo branch.

MBA Association Organize Orientation Program

The orientation program of the 2023 MBA batch was held on 21 October 2023. This annual event was organized by the MBA Association. Mr. Thushantha Karunanayake, Director, PCI SOLUTIONS PVT LTD, a distinguished MBA Alumni was the keynote speaker at the event. This event was graced by Prof. Sarath Kodithuwakku, Founder of the MBA program and Dean of Faculty of Agriculture, Prof. C.M.B. Dematawewa, Director, PGIA, Prof. Pahan Prasada, Chairperson, Board of Study of Business Administration, Dr. Dilini Hemachandra, Secretary of the Board of Study of Business Administration, K.A.B. Damunupola, Deputy Registrar of PGIA, lecturers and MBA students of 2022 and 2023 Batches. The new students had the opportunity to meet the panel of teachers and interact with the current students.

General Convocation 2023
University of Peradeniya

The 84th General Convocations of the University of Peradeniya was held with much splendor at the University Gymnasium on 24 May 2023. A total of 198 graduates of the PGIA inclusive of 16 Ph.D., 14 M.Phil., 156 M.Sc. and 12 MBA were conferred degrees at the Convocation ceremony.

New Board of Management Members Appointed

The following ex-officio members were appointed by the UGC to the Board of Management of the institute.

Dr. K.M. Mohotti (Director, Tea Research Institute of Sri Lanka) from 11.05.2023 to 15.01.2026.
Mr. M.J.M. Ifham (Assistant Director, Department of National Budget, Ministry of Finance, Economic Stabilization and National Policies) from 2023.07.27-2026.07.27.

PGIA – On Path Along The Quality Assurance Process

Quality assurance is a planned systematic review process of higher educational institutions to ensure acceptable standards of quality in teaching, research and education with continuous infrastructure enhancement to achieve best results. All employees of an institution are held responsible for maintaining expected quality on all aspects of higher education. In the process of quality assurance several important areas could be identified which begins with the policy and procedures in higher education, monitoring and periodic review of all programs offered, quality assessment of students and teaching staff, information systems, society expectations of graduates and public information.

To ensure high quality in all its activities several initiatives have been taken by the institute. An Internal Quality Assurance Cell of the PGIA (IQAC) was established in 2020 under the Center for Quality Assurance (CQA) of the University of Peradeniya which was established in 2015. The function of the IQAC – PGIA is to coordinate all QA related activities in liaison with the QCA in conformity with the guidelines issued by the UGC. The functions and responsibilities of IQAC-PGIA are in broad range of academic and administrative disciplines to ensure quality of degree and non degree programs, research and outreach activities of the institute based on its Strategic Plan.

Currently, the institute is focusing on M.Phil and Ph.D programs and the reviews are scheduled for 2024. According, to this schedule all programs in different Boards of Study will be reviewed in 2024 -2027. The Chairpersons for Self Evaluation Report (SER) preparation has also been appointed for program review of M.Phil and Ph.D.s under different criteria as follows:

Criteria 1. Program Management	Prof. K.S. Hemachandra
Criteria 2. Program Design and Development	Prof. B.E.P. Mendis
Criteria 3. Human and Physical Resources and Learner Support	Prof. H.M.G.S.B. Hitinayaka
Criteria 4. Teaching-Learning and Research	Prof. S.A.C.N. Perera
Criteria 5. Student Assessment and Award of Qualifications	Prof. G.L.L.P. Silva
Criteria 6. Program Evaluation	Prof. H.L.J. Weerahewa
Criteria 7. Innovative and Healthy Practices	Prof. R.S. Dharmakeethi

Presently, Dr. Harshani Siriwardana is serving as the PGIA-IQAC Coordinator and representative of the Management Committee of the CQA.

"Quality is not an act, it is a habit. It is the pride and workmanship and everyone's responsibility."

Peradeniya University Awarded Highest Grade in the Institutional Review

In the recent Institutional Review conducted by the UGC (IR 2018-2023), Peradeniya University was adjudged as outstanding and awarded highest Grade A. The contribution of the PGIA to the University to Internal Review was significant as separate criteria were available for postgraduate studies, research, innovation and commercialization.

This review process included the submission of a Self Evaluation Report (SER) on specified activities of the institute to the UGC and its review by a panel which took place on 23 May 2023. IQAC members Profs Gamini Hitinayake, Udaya Vitharana, Jeevika Weerahewa, Pradeepa Silva and Mowjood took part in writing of the SER.

Prof. C.M.B. Dematawewa, Director/PGIA made a presentation on the report to the Review Panel followed by discussions with the Chairpersons and members of the Boards of Study, teaching panels including the temporary academic staff and employees of the institute.

Staff/Student News

New Appointments to the Staff

PROF. GAMINI PUSHPAKUMARA APPOINTED AS NEW DIRECTOR, PGIA

On 29 January 2024, the University Grants Commission appointed Prof. Gamini Pushpakumara, the former Dean of the Faculty of Agriculture, as the new Director of the Postgraduate Institute of Agriculture (PGIA). He takes over from Prof. Mahinda Dematawewa, who has concluded his term as Director.

Prof. Pushpakumara is an alumnus of the University of Peradeniya's Faculty of Agriculture, graduating in 1990. He joined the Department of Crop Science, Faculty of Agriculture, and later pursued advanced studies at the prestigious University of Oxford, UK, where he pursued M.Sc. in Forestry and Land Use and a Ph.D. in Forest Genetics and Germplasm Conservation. He is a Fellow of the National Academy of Sciences, a visiting professor of several foreign Universities, a steering committee member of the Asia-Pacific Forestry Education Coordination Mechanism and several international fora, and a member of several international societies. Education Coordination Mechanism and several international fora, and a member of several international societies. He also served as the country liaison scientist of the World Agroforestry Centre, Nairobi, Kenya from 2005 to 2015. With more than 100 peer-reviewed publications to his credit, Prof. Pushpakumara is a respected figure in the scientific community. He has significantly contributed to academic literature, including several book chapters. His experience extends beyond research; he is a skilled academic administrator with expertise in agricultural education policies and the development of high-level human resources.

The PGIA extends its warmest congratulations to Prof. Pushpakumara on his new role as Director and wish him continued success in all future endeavors.

Bhawana is the new Course Coordintor

Ms. J.M.L. Bhawana, graduated in Agribusiness Management from the University of Ruhuna was appointed as the new Course Coordinator of the institute on 09 October '23 . She succeeded the previous Coordinator Ms. Chamali Wickremasinghe who joined an overseas university to pursue higher studies. Ms. Bhawana counts work experience as a visiting lecturer of the National Institute of Plantation Management and as Project Assistant of the Open University of Sri Lanka. Ms. Bhawana will work as the Secretary and member of the Editorial Board of the PGIA Newsletter.

New Management Assistants Appointed

Mr. R.J. Danuska and Ms. U.W.I.R Kumari joined the Administration branch as Management Assistants. Previously they have been employed in similar positions in the Uva Wellassa and Colombo Universities respectively.

Retirements

Shanthi Hapuarachchi

Joining the institute in 1988, more than 35 years ago, Shanthi's career ended in 2023 as a Senior Staff Management Assistant. She provided an excellent service to the institute with dedication and commitment. Besides, she was a competent and trustworthy stenographer and provided efficient service to the Board of Management of the institute.

Hemanthi Samarasinghe

Mrs. Samarasinghe as a Senior Staff Management Assistant served the institute for 38 years. She was an able officer highly efficient and trustworthy. She was very helpful to both the staff and the students, always courteous and enriched with positive thinking.

The Institute Wishes Both These Officers Happy Retirement!

New Appointments to the Teaching Panel

Board of Study in Business Administration
Mr. Janaka Heenkenda

Board of Study in Food Science and Technology
Dr. DMSS Daundasekara

Board of Study in Biostatistics
Dr. JSNP Dharmawardena

Board of Study in Soil Science
Dr. Surantha Salgadoe
Dr. D.M.P.D. Dissanayake

Board of Study in Agricultural Economics
Dr. D. Gunathilake

ENIGMA OF COLLECTIVE ACTION OF TEA SMALLHOLDERS' ORGANISATIONS: KEY FACTORS CONTRIBUTING TO THE EFFICACY OF 'TEA SMALLHOLDING DEVELOPMENT SOCIETIES' IN SRI LANKA

K.G.J.P. MAHINDAPALA
Ph.D.
B/S in Agric. Extension
Senior Supervisor:
Dr. M.W.A. P. Jayatilaka

The existence of Farmer Organizations(FOs) is greatly challenged worldwide in the present neoliberal economic context. Therefore, it was imperative to find a solution for the present situation faced by farmer organisations. The government of Sri Lanka established the Tea Smallholding Development Societies (TSHDS) to facilitate the smallholders. This study sought to assess the efficacy of TSHDSs, evaluate the collective action of the TSHDSs, investigate the relationship between collective action and the efficacy, assess major factors contributing to the efficacy of TSHDSs and the collective action of TSHDSs. Data were collected from key officials and members of TSHDS and Tea Inspectors using structured questionnaires. Majority of the TSHDSs were not market-oriented. There was a significant correlation between the efficacy of TSHDSs and collective action. Nevertheless, these two variables can even behave in a vicious circle. The knowledge, attitudes and commitment of key leaders significantly influence the effectiveness of TSHDS. Majority of the TSHDS lacked in combating the challenges imposed by modernisation. Government intervention has undermined the self-reliance of TSHDS. Tangible and non-tangible economic benefits generated within the entity act as an incentive. Social capital attributes among different actors in TSHDSs were positively associated with collective action. Study found collective action, leaders' attributes, linking capital, self-reliance, and regional development status as the key factors that affect the efficacy of TSHDS. Incentive and social capital dimensions were the most influential factors that affect collective action. Finally, this study recommends for removing government intervention in controlling FOs and adopting an appropriate commercialisation approach.

VARIATION OF STANDING BIOMASS, VEGETATION STRUCTURE AND SPECIES DIVERSITY IN SRI LANKAN TROPICAL RAINFORESTS ALONG AN ALTITUDINAL GRADIENT

H. K. N. Sanjeewani
Ph.D.
B/S in Crop Science
Senior Supervisor:
Prof. W.A.J.M. De Costa

Tropical rainforests of Sri Lanka (TRFSLs) are instrumental in global climate regulation and are reservoirs of biodiversity. This comprehensive study sought to explain how environmental fluctuations across varying altitudes (117-2132m) affect vegetation diversity, biomass, and their growth rates within TRFSLs. Detailed surveys conducted between 2019 and 2021 across ten permanent sampling plots identified a diverse array of 8,027 trees from 276 species. Stem density and total basal area per ha presented unique altitudinal trends, while overall diversity and species richness tended to diminish with increasing altitude. A notable 85% of tree species exhibited strong environmental specificity, with a majority of them being endemic and endangered. Climatic variables, particularly diurnal temperature range, rainfall, and soil nutrients (e.g. nitrogen), emerged as significant determinants influencing tree growth, diversity, and biomass. Total biomass per ha, which was determined by basal area, tree height, and wood specific gravity, showed a peak at 1100m altitude. The study also brought to light a distinct altitudinal trend in tree growth increment rates, revealing that TRFSLs have a heightened temperature sensitivity, markedly surpassing global averages. Further, short-term growth evaluations conducted over a span of 15 months highlighted differences in growth efficiencies of tree species across various altitudes. Importantly, this study showed that the factors governing tree diversity are distinct from those influencing their growth rates. Collectively, results of study indicated the possible impacts of future climate change on TRFSLs, thus underlining the pressing need for strategic restoration and sustainable management approaches tailored for this crucially-important eco-system for Sri Lanka.

PROCESSED FOOD TRADE IN SOUTH ASIA: AN ANALYSIS OF PATTERNS, POTENTIAL AND BARRIERS

Sara Sahibzada
Ph.D.
B/S in Agric. Economics
Senior Supervisor:
Prof. H.L.J. Weerahewa

This research examine patterns, potentials, and barriers to processed food exports in Bangladesh, India, Pakistan, and Sri Lanka. The thesis consists of information on trends and patterns of processed food trade from South Asia and two main objectives. The first objective investigates the potential effects of trade policy changes on the export of processed food from South Asia using the Global Trade Analysis Project (GTAP) model version 10. Firstly, investigates the associated welfare and trade effects under different trade agreements that can be adopted by the governments of South Asia. The overall effect of getting a concession from the Generalized System of Preferences (GSP) from developed countries particularly the EU was a largely beneficial and better strategy than forming Free Trade Agreements)FTAs(for the exporters of processed food in South Asian countries. Secondly, evaluate the associate welfare and trade effects of the policy response to crises like COVID-19 using various trade policy options (i.e.25 percent unilateral import liberalization by China and Saudi Arabia, 10 percent unilateral export restriction by India and Pakistan on processed food Vs. all trade options). The overall effect of the policy response to COVID-19 by major trading partners was largely beneficial for exporters of processed food in South Asian countries. The second objective of this thesis firstly uses the Gravity model to determine the effects of NTMs on fruit exports from Bangladesh, India, Pakistan, and Sri Lanka during the 2001-2018 period. Overall, this objective sheds light on an under-researched aspect of trade liberalization: the proliferation and increase of NTMs and the negative effect of TBTs and SPSs in most South Asian countries. Greater attention needs to be given to NTMs by trade negotiators, policymakers, and multilateral agencies such as the World Trade Organization, World Bank, and International Monetary Fund (IMF).

HOST-PATHOGEN INTERACTIONS OF SUGARCANE SMUT (*Sporisorium scitamineum)* PATHOSYSTEM TOWARDS DEVELOPMENT OF AN INTEGRATED DISEASE MANAGEMENT PROGRAM

A.N.W. Sumedha Thushari
Ph.D.
B/S in Plant Protection
Senior Supervisor:
Senior Prof. D.M. De Costa

The study focused on the integrated management of sugarcane smut disease caused by *Sporisorium scitamineum*, a significant threat to sugarcane cultivation in Sri Lanka. The study included identification of resistant parents from local sugarcane germplasm, determining morphological and biochemical markers for smut resistance for early identification of resistant varieties, studying genomic variation of the pathogen, evaluating and identification of effective fungicides and chemical elicitors, and developing a protocol for early selection of resistant sugarcane varieties using gene expression studies. Out of the total tested 455 accessions, 124 which were highly resistant to smut disease in both plant and ratoon crop cycles were identified as potential parents for directional breeding for smut resistance. Four morphological and biochemical characteristics namely total phenol content, bud hardness, foliage inclination angle, and scale leaves in bud were identified as indicators for early selection of smut resistance varieties. Genetic and morphological variations of *S. scitamineum* isolates were evaluated, indicating moderate genetic diversity among sugarcane smut isolates in Sri Lanka. Three fungicides and two synthetic elicitors were tested in vitro to evaluate the inhibition of germination of smut spores. Among them, Tebuconazole 250 EW (500 ppm) and Hexaconazole 50 EC (250 ppm and 500 ppm) salicylic acid (1000 ppm) are effective in preventing sugarcane from smut disease development under field conditions. The study proposed a protocol for early selection based on the expression of β-1,3-glucanase gene in sugarcane plants. The research identified highly-resistant parents, markers for early detection of resistant germplasm, genetic diversity of the pathogen, and effective control measures. These findings offer valuable insights for integrated management and breeding of smut-resistant sugarcane varieties, addressing a critical need in the sugar industry in Sri Lanka.

MORPHOLOGICAL, MOLECULAR, AND BIOCHEMICAL PROFILING AND ANTIMICROBIAL ACTIVITY OF *Cinnamomum* SPECIES IN SRI LANKA

B.S. Bandusekara
Ph.D.
B/S in Crop Science
Senior Supervisor:
Prof. P.C.G. Bandaranayake

The future of the Ceylon Cinnamon industry can not survive only being a common spice. The current trend of the cinnamon industry focuses on the pharmaceutical industry, natural product industry, essential oil industry, and related value-added products. Recent scientific evidence ensures true cinnamon's superiority in health properties. Similarly, several wild species of cinnamon have also gained attention as valuable crop wild relatives. The present study investigated and compared the morphological, molecular diversity, and biochemical profiles of all the *Cinnamomum* species found in Sri Lanka collected from different locations. These are *C. ovalifolium, C. litseifolium, C. citriodorum, C. capparu-coronde, C. dubium, C. rivulorum, and C. sinharajaense*. Interestingly no species had a detectable level of coumarin or coumaric acid which is considered a carcinogenic compound when available in high quantities and is present in relatively higher concentrations in *cassia* cinnamon. *C. sinharajaense* shared similar leaf volatile oil profiles and competitive leaf-eugenol and bark-cinnamaldehyde content to the cultivated varieties Sri Gemunu and Sri Wijaya. Further, it has shown high TPC, AOX, and antimicrobial activity as well. Some of the economically important volatile compounds observed in the wild species are eugenol, benzyl-benzoate, caryophyllene, phellandrene, linalool, germacrene, eucalyptol, humulene, microlens, terpineol, pinene, copaene, cadinol, and santalol. The observed inter and intraspecies chemical diversity and unique volatile oil profiles suggest sustainable utilization of existing germplasm. *C. sinharajaense* and *C. capparu-coronde* can be potential condidates for future breeding programs of Ceylone Cinnamon. The richness of volatile compounds in the *Cinnamomum* genus suggests adaptability to trending landscape of pharmaceutical and foods trends in the world. To capitalize on emerging opportunities in the cinnamon industry, conducting market-oriented research and development programs is essential, with the current findings serving as a foundational basis; moreover, this study underscores the significance of conserving underutilized crops and promoting their domestication for future research endeavors.

FORECASTING RAINFALL ANOMALIES AND MODELLING EXTREME RAINFALL EVENTS IN SRI LANKA

P.W. Jeewanthi
M.Phil.
B/S in Bio-Statistics
Senior Supervisor:
Dr. Wasana Wijesuriya

The missing precipitation data and the unexpected occurrence of rainfall anomalies are serious and recurring challenges in planning agriculture activities. In this context, this study aimed to select the most appropriate method for estimating missing precipitation data and investigate the most appropriate method for modelling and forecasting rainfall anomalies. The locations were selected to represent seven agro-climatic zones and monthly precipitation data for the period of 1980 to 2020 were used for the study. The missing rainfall data were estimated using three temporal methods, four spatial methods, and eight machine learning (ML) algorithms. The performance of temporal and spatial methods varies from region to region. However, ML algorithms performed well in estimating missing rainfall data compared to conventional temporal and spatial methods. Among ML algorithms, the Boosting Ensemble Algorithm provides the best results in estimating missing rainfall data for all agro-climatic zones in Sri Lanka. The rainfall anomalies were studied using the Standardized Precipitation Index (SPI) at different time intervals. The rainfall anomalies were modelled and forecasted using the Seasonal Auto-Regressive Integrated Moving Average (SARIMA) method, and two artificial neural network time series techniques. The results showed that the performance of artificial neural networks was better than SARIMA in forecasting rainfall anomalies. Furthermore, the nonlinear auto-regressive external (Exogenous) input neural network was the best method for forecasting rainfall anomalies in all seven agro-climatic zones in Sri Lanka.

ASSESSING THE ECONOMIC VALUE OF EXISTING CLIMATE INFORMATION BY SRI LANKAN PADDY FARMERS

N. M. K. C. Premarathne
M.Phil.
B/S in Agric. Economics
Senior Supervisor:
Prof. L.H.P. Gunaratne

The weather/climate information creates certainty and confidence in the farmers' minds, which reflect as the expected utility. The expected utility helps them to use other inputs during crop production. No studies have been conducted before in Sri Lanka to find out the impact of the expected utility, that derived due to weather/climate information by paddy farmers or examine their weather/climate information use behaviour. Thus, the research was conducted using a sample of 900 farmers across six districts for the duration of 2016- 2018, representing all paddy farming systems in Sri Lanka. The data analysis was mainly conducted by employing a behavioural model, and a quasi-experimental setup. According to results, an information gap was found with respect to major crop management events. This gap in scientific weather/ climate information has induced the use of traditional weather / climate predictions, which is not very reliable. The results of behaviour model based on the Theory of Planned Behaviour showed, the change of behavioural beliefs such as attitude, intention, perceived difficulties, reliability are essential to determine or alter the use of the existing weather/climate information uses. The provision of location specific weather/climate information was found to be effective, since it provides the highest expected utility as estimated by the CRRA utility function. This highlights the potential for developing location specific weather/climate information product packages by targeting the users' expectations. For instance, it is important to create a public - private partnership to provide accurate weather/climate information to support paddy farming decisions.

DEVELOPMENT AND CHARACTERIZATION OF PALMYRAH *(Borassus Flabellifer L.)* TUBER STARCH INCORPORATED ACTIVE BIODEGRADABLE PACKAGING FILM

N. Sobini
M.Sc.
B/S in Food Science
and Technology
Senior Supervisor:
Mr. P. C. Arampath

Non-biodegradable synthetic packaging materials cause tremendous harmful effects on the ecosystem. As an alternative, biodegradable packaging materials have been introduced in food industries. Starch is one of the most important polysaccharides used in the formulation of biodegradable edible packaging films. Palmyrah (Borassus flabellifer L.) tuber is rich source of starch. The main objective of this research was the development and characterization of bio-degradable films for fresh cut fruits and vegetables. Five treatments with different ingredient formulations of palmyrah starch and gelatine mixed in distilled water and glycerol were experimented in forming packaging film solution and their physical parameters were assessed. Results revealed that treatment containing 4% starch and 1% gelatine had the highest tensile strength with 10.0±0.00 MPa. Also it has favourable values such as 4.10±0.00 g/m2.d of water vapour transmission rate, 0.14±0.01 mm of film thickness, 14.43±0.02 % of moisture content, 63.09±0.03 % of solubility and 41.00±1.41 mm of elongation at break parameters. Further, T3 film was enriched by incorporating clove oil, cinnamon oil, and the preservatives such as sodium metabisulphite, sodium benzoate and potassium sorbate to obtain antibacterial activity. The 1.5% concentration of clove oil or cinnamon oil exhibited antimicrobial activity against Escherichia coli, Bacillus brevis and Pseudomonas aeruginosa while other concentrations were less effective. The inhibitory zone was not observed in treatments with preservatives. In conclusion, the formulation comprised of 4% palmyrah tuber starch, 1% gelatine and 1.5% glycerol enriched with either 1.5% clove oil or cinnamon oil could be considered as the best formulation for development of biodegradable packaging material with antimicrobial activity.

HOW STRONG IS THE LINKAGE BETWEEN TOURISM AND ECONOMIC GROWTH IN SRI LANKA: EVIDENCE FROM 1971-2020

E.V.D.Dilhani
M.Sc.
B/S in Bio-Statistics
Senior Supervisor:
Prof. N.R.Abeynayake

The study focused on the relationship between tourism and the economic growth of Sri Lanka, with empirical evidences from 1971 to 2019 and during COVID-19 pandemic period. Annual Gross Domestic Product, Annual Official Tourist Receipts, and monthly aggregate tourist arrivals in Sri Lanka were the variables of the statistical analysis. Dummy variables were included for the unknown structural changes during the period. The new contribution from this research to the research field is the adaption of structural breaks into the model. This is the first study that the Sri Lankan tourism industry has used that applies new adaptations. Annual time series data were examined by estimating the VAR model, Granger causality test and time series regression model. The findings of the study say there is no sound background to prove the competence of tourism-led growth hypothesis to Sri Lanka. But, Number of previous studies have proven the opposite conclusion with their loose applications of statistical application for the same research question. Sri Lanka is facing an economic drastically drown back situation due to excessive exchange rate for US$, lack of Dollar in Sri Lankan reserve funds and many more reasons. The empirical findings of the study show that there is a short run relationship between tourism and the economic sector. The review study confirm that it is very important to give more attention on tourism development of Sri Lanka as an immediate solution to Sri Lanka's grave economic crisis.

EFFECTIVENESS OF CLIMATE CHANGE ADAPTATION STRATEGIES IN DRY ZONE FARMING SYSTEMS (A COMPARATIVE STUDY IN HORIVILA-PALUGASWEWA AND SIVALAKULAMA CASCADES)

M.M.G.S. Dilini
M.Sc.
B/S in Agric. Engineering
Senior Supervisor:
Prof. E.R.N. Gunawardena

The study investigated climate change adaptation strategies in village tank cascade systems within the Malwathu Oya drainage basin in the Dry Zone of Sri Lanka. Focused on Horivila-Palugaswewa and Sivalakulama cascades, the research aimed to identify exposure and sensitivity to climate change, assess farmers' awareness, evaluate adaptation strategy effectiveness, and identify constraints. Data collection involved questionnaire surveys, field observations, mapping exercises, and institutional data records. Statistical analysis, including the Adaptation Strategy Index (ASI) and Problem Confrontation Index (PCI), was conducted using SPSS. Results highlighted a 4% increase in natural vegetation/forest plantation in the Horivila-Palugaswewa cascade from 1981 to 2019, contrasting with a drastic decrease in forested areas in the Sivalakulama cascade due to upland cultivation. Farming experience emerged as a crucial factor influencing adaptation, with those participating in awareness programs being more inclined to adopt strategies. The use of alternative water sources, shorter cycle paddy varieties, and weather-guided crop planning were identified as effective adaptation measures. Farmers in both cascades who adopted strategies for water scarcity secured seasonal cultivation ability and marketable paddy yields. Crop damages and animal disturbances were major constraints in Horivila-Palugaswewa, while the lack of instrumental/technological support was predominant in Sivalakulama. Overall, the research underscored the significance of farmer awareness, experience, and tailored adaptation measures in enhancing resilience to climate change in vulnerable agricultural systems.

Research Briefs Contd……

ESTABLISHMENT OF LIQUID CULTURE SYSTEM TO ENHANCE GROWTH AND SECONDARY METABOLITES SYNTHESIS OF *Gyrinops walla* (Agarwood)

D.B.R. Kaushalya
M.Sc.
B/S in Crop Science
Senior Supervisor:
Prof. J.P.E. Eeswara

This study demonstrated an efficient method of rapid multiplication and product synthesis for *Gyrinops walla*. Higher biomass accumulation was achieved under liquid system, but malformation occurred, it could be overcome using support of matrix. The nature of the matrix was found to be a vital factor to achieve the desired benefits. Here Hybrid type system was also developed as Double layer system and the necessity of a matrix was skipped, while taking the benefits of liquid system. Also the relationship between biomass accumulation and secondary metabolite synthesis with the external application of Jasmonic Acid (JA), Chitosan (CHI) were investigated under semi-solid condition while Salicylic Acid (SA) was tested under liquid and semi-solid condition. In term of biomass accumulation SA and JA shows inverse relationship, moreover the reduction is higher in JA treated cultures. Positive effects were observed in CHI treated cultures but up-to 100µM, complete death of shoots occurred in both JA and CHI 1000µm. Elicited shoots were subjected to GCMS for compound identification. Many compounds identified here were reported in earlier agarwood studies. Jasmonic acid and Chitosan elicited sample showed higher number of compound than the Salysilic acid elicited shoot extracts and elicitation under liquid condition found more productive than the semisolid system.

Conferences, Seminars & Training Workshops

Pre-Congress Workshops

Generating Reliable and Accurate Data in Field Experiments

The workshop on generating reliable and accurate data in field experiments was held on 27 October. It was organized by the Congress organizing committee and coordinated by Prof. S.A.C.N. Perera. The participants were field officers and the technical officers from private sector. The workshop covered the areas of how to design and execute field experiments to collect reliable data for effective decision making and trustworthy insights in agricultural research. The resource persons included Profs C.M.B. Dematawewa, Saman Dharmakeerthi, Devika de Costa and K.S. Hemachandra.

Data Analysis Using Statistical Software

The second Congress workshop on data analysis using statistical software was held on 4 November as an on-ground event at the IT unit of PGIA. The workshop was organized by the Congress organizing committee of PGIA and coordinated by Dr. D.M.S.B. Dissanayake. The program targeted on postgraduate students and many officers from various agricultural institutes. 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 under the supervision of an expert panel. The resource persons for the workshop were Profs T. Sivananthawerl and B.M.L.D.B. Suriyagoda.

Basic Statistics For Field Experiments

Basic statistics for field experiments was the third Congress workshop held on 10 November. The workshop targeted on BSc level officers from private and public sectors. It was focused on the basics in designing and analyzing data generated in field experiments in agriculture. The resource person was Prof. C.M.B.Dematawewa, the Director of PGIA. The workshop was organized by the Congress organizing committee of PGIA under the coordination of Prof. S.A.C.N.Perera.

Enhancing the Quality of Agriculture Research with Community Engagement and Involvement

The fourth and the final pre-congress workshop was held on 11 November. It was on enhancing the quality of agriculture research with community engagement and involvement and conducted by Institute of Research and Development in Health and Social care (IRD) on collaboration with the PGIA. The resource persons were Prof. Athula Sumathipala, Dr. Jim Elliot, Dr. Godwin Kodithuwakku, Prof. Duminda Guruge, Dr. Prabhath Ranasinghe and Prof. Thilini Agampodi. The program was conducted both on-ground and online. It was organized by the Congress organizing committee. The coordinator of the program was Prof. S.A.C.N.Perera.

Professional Skills Development Workshop

A workshop on professional skill development was conducted by the B/S in Agricultural Extension for the students following MSc program in Organizational Management and Developmental Communication and Extension. The workshop was conducted by Dr.Wijaya Jayathilaka at from April 1-2, 2023. The workshop covered areas of what is professionalism, professional ethics, professional organizations and etiquette.

Outbounding Training Program

The Board of Study in Agricultural Extension conducted the annual out bound training program for the students following MSc in Organizational Management and Developmental Communication and Extension. It was held at Ratnasiri Wickramanayake National Training Centre (RWNTC), Hantana and carried out by the team of "Head Adventures" from 25 -26 of February 2023. This event was organized by Dr. Chandana Jayawardena, with the assistance of Ms. Ishani Herath to provide a valuable learning experience particularly for the students, away from the conventional classroom.



Cap-Net Lanka - PGIA Activities

Climate Change and Water Dialogues 2023 and Beyond

The Embassy of the Kingdom of the Netherlands in Sri Lanka together with the International Water Management Institute (IWMI) organized the Climate Change and Water Dialogues 2023 and Beyond on 9 March 2023 at the BMICH Colombo.

This event focused on "2023 and beyond " in the context of international dialogues took place in 2023 such as the UN 2023 Water Conference and regional events in the lead-up to COP28 later in 2023. The speakers from the Netherlands, IWMI, Maldives, and Sri Lanka shared their insights on recent developments and strategies for the future. The policymakers, private sector, and researchers actively contributed to the panel discussion regarding governance intervention for climate change in Sri Lanka and lessons from neighboring islands, the Maldives for adaptation to climate change. Dr. Sewwandhi Chandrasekara, Country Coordinator, Cap-Net Lanka participated in this event.

The National Water Management Plan - 2023 Yala Season

The National Water Management Plan was presented for the upcoming minor cultivation (Yala) season, in Sri Lanka. The Water Management Committee meeting, scheduled for the 2023 Yala season, was held at the National Agriculture Information and Communication Centre in Gannoruwa on 23 March 2023.

Mr. U.D.C. Jayalal, Secretary, Ministry of Irrigation, Mr. Keerthi B. Kotagama, Director General, Sri Lanka Mahaweli Authority, officials from the Ministry of Agriculture, district secretaries and representatives from farmers' organizations participated. Dr. Sewwandhi Chandrasekara, Country Coordinator, Cap-Net Lanka participated in this event.

The CGIAR Climate Resilience Initiative Launch ClimBeR Work Package – 4

ClimBeR stands for Building Systemic Resilience against Climate Variability and Extremes and will run for an initial phase of three years (2022-2024) in six target countries: Senegal, Morocco, Zambia, Kenya, the Philippines and Guatemala. ClimBeR work package 4 focuses on implementing a bottom-up polycentric governance process that provides opportunities for self-organization and learning across systems, but independent decision-making for adaptation planning and implementation at local level.

This work package will: 1) develop and integrate a bottom-up multiscale polycentric governance frameworks for reducing systemic cascading risks; 2) co-demonstrate transformative adaptation options with relevant actors to illustrate applicability across scales; and 3) co-develop "champions of change" to advocate polycentric multiscale governance to target local investments for empowering farmers, including women. In summary, the WP4 promotes an innovative and flexible theoretical framework that combines institutional, social and policy network approaches to understand power imbalances and cross-level interactions for a socially equitable transformative adaptation and implementing sustainable strategies in response to climate change.

Dr. Sewwandhi Chandrasekara, Cap-Net Lanka Country Coordinator, participated in the launching ceremony of this initiative at the IWMI Headquarters, Colombo, Sri Lanka.

Training Workshop for Community Leaders on Soil Erosion Control & Water Conservation through the Establishment of Small Block Plantations of Bamboo

Cap-Net Lanka and ReDI (Research for Development Innovation Alliance Lanka) an NGO jointly organized the above training workshop for community leaders on soil erosion control and water conservation by establishment of small block plantations of bamboo for community leaders in Kandy district on 2 June 2023 at the Presbyterian Church, Kandy. Altogether, 12 participants representing divisional secretariats, water utility entities, village committees, and entrepreneurs participated in this activity. Dr. Sewwandhi Chandrasekara, Country Coordinator, Cap-Net Lanka and Ms. Swarnamali Abeysuriya, CEO of ReDI coordinated the above program.

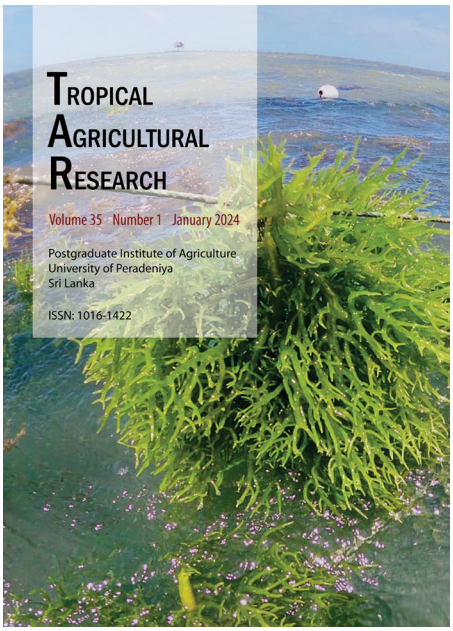
Scientific Discussion on "Ancient Irrigation Systems: Lessons from the Past"

Dr. Sewwandhi Chandrasekara participated in the scientific discussion on Ancient Irrigation Systems: Lessons from the Past held on 17 May 2023 at the Postgraduate Institute of Science (PGIS).

Awareness creation of School Children of Trinity College, Kandy on "Climate Change and What We Can Do"

Dr Sewwandhi Chandrasekara made a presentation on "Climate Change and What We Can Do" to grades 6 to 9 students and teachers of Trinity College, Kandy on 5 July 2023 and distributed "Ma Jala binduwak nam" book to the winners of the Art and Poetry competition held parallel to the Climate Week.

New Publications



Tropical Agricultural Research (TAR) Journal
Volume 35(1) 2024

The above issue of TAR, the official journal of the Postgraduate Institute of Agriculture, University of Peradeniya was launched at the inaugaral session of the 35th Annual Congress held on 17 November 2023. Authors can obtain a hard copy of the journal from the TAR Journal Secratariat. This is also available online (https://tar.sljol.info/).

Social News

Blessings for the New Year 2023

As the year 2023 is dawning, PGIA staff commenced their work on the 1st of January with the Blessing of the Noble Triple Gem. A dhamma sermon was organized before commencing the office work for the New Year.

Pass List - Masters Degree (January to December 2023)

B/S in Plant Protection

P.A.M.T.H. Perera
W.M.P. Kalpani
S.M.N.S. Samarakoon

B/S in Animal Science

W.S.M.H. Kumara
W.M.A.S. Wijesundara
W.G.S.B. Nandasena
H.G.C.L. Gamage
S.T.D. De Silva

B/S in Bio Statistics

D.R.N.N. Rathnayake
Dr. E.M.S.K. Senavirathna
P.A.A.C. Pitigalaarachchi
D.K.N.S. De Silva
E.V.D. Dilhani
W.A.D.S.K. Wijesinghe

B/S in Agricultural Enginnering

M.M.G.S. Dilini
W.K.B.A.S. Parakkrama
S.T. Kariyawasam
M.R. Shafna
Y.M.M.M. Yapa
K.H.C. Sandaruwani
S.A.D.P. Suraweera

B/S in Food Science and Technology

Y. Sindujan
P.N. Attanayaka
I.B.M.R.T.T. Muwanvella
W.H.J. Chandrasiri
H.M.A.U. Hippola
H.M.C.P.K. Herath
E.M.M.D. Edirisinghe
D.V.P. Chandramali
H.M.S.S. Senadeera
H.M.C.R.K. Hennayake
B.L.I. Jayathma
U. N. J. Dahanayake
G.D.A.U. Dayananda
H.F.M.H. Fonseka
K.S.M.Dissanayake
P.G.Y.S. Liyanage
P.W. Hashini Nimesha
P.Y. Ransilu
I.S. Eashwarage
N. Thurkkatheepan
S.D.C. Sewwandi
M.N.D. Vitharana
L. Rajanayagam
A.A.B. Abayarathne
S.I. Jayathilaka
A.C.C. Lokuliyana
W.H.K. Dayarathna
C.D. Kodithuwakkuarachchi
K.A.T.K. Jayalath
W.M.N.K. Walisundara
K.M.P. Dewapura
H.A.W.H. Hasinthara
R.M.N.H.K Babalagama
R.S.L. Gomes
N.D.A.N. Perera
P.A.L. Pathirage
C.M. Jayasinghe
J.A.A.S. Jayaweera
A.R. De Silva
H.S.S. Sandeepani
P.A.M. Jayawardana
H.M.N.A. Herath
M.R.A. Rifath
Y.T.H. Kumaragama
Dr. V.G.N. Harshani
Dr. C. M. Wickramatilake
P.G.V.J. Ranaweera
S. Maathumai
Sobini N.

B/S in Agricultural Economics

N.M.S. Nawarathna
W.A.D. Vimukthi
B.M.S.K. Ekanayake
K.T.I. Wijewardana
M.D. Priyadarshani
R.D.A.K. Ranasinghe
U.W.N.N. Nayanathara
S.S.W.B.M.S.N.B. Ekanayake

B/S in Soil Science

W.A.M.S. Wickramaarachchi
S.S.P. Munasinghe
B.R. Kulasekara
M.M.C. Devapriya
D.P.D.N. Kalpana
I.G.B.S. Samaranayake
H.I. Madushani
B.L.R.E. Liyanage
L. Logarasa
D.M.A. Iromi

B/S in Business Administration

M.N. Mazahira
M.K.G. Morawaka
G.G.N.M.L.C.K. Nawarathna
W.M.T.S. Weerasekara
I.K.P.Y. Perera
D.S.A.W. Kodithuwakku
E.M.D.S. Ekanayake
M.S.M. Fiyasdeen
A.F.I. Ahamed
W.M.S. Rupasinghe
K. Madhavan
H.M.Y.D.K. Herath

B/S in Crop Science

W.MD.N. Weerasekara
J.M.G.M.S. Karunarathna
V. Indrakala
K.G.D.N. Jayasinghe
H.P.C.J. Pathirana
A.M.U.K. Attanayake
H.V.J.L. Priyadarshana
A.M.K.D. Alahakoon
U.S. Herath
A.A.C.H. Dharmasena
T.M.M.P. Bandara
R.M.T. Perera
D.S.M.M.S.M. Samiraja
K.A.M.R.P. Atapattu
W.P.P.T. Wickramaachchi
M.A.T. Perera
H.M.P.S.K. Chandrarathne
H.M.Y.D.K. Herath

B/S in Agricultural Extension

S.N.M.T.D.B. Narayana
N.D.K. Priyadarshani
M.L.R.J. Fernando
S.W.R.M.N.H. Rajakaruna
J.A.D.U. Premachandra
M.P.C.P. Menikge
W.I.M. Wickramarachchi
W.W.P.W.M.R.V.J. Gopallawa
H.M.S.H. Charuni
M.R.C.U. Jayaratne
P. Weththasinghe
K.A.G.A.D.H. Kumarihamy
D.M.G.K. Dissanayaka
K.G.M.J.W. Gunapala
R.M.C.P. Bandara
V.G.D.T. De Silva
D.M.K. Herath
H.M.P.M. Dayarathne
L.H.M. Sandamali
K.S.N.Dayananda
S.P.A.P.K. Jayarathna
I.A.S.D. Idirimanna
R.D.C.R. Sandarenu
L. A. I Prematthilaka
H.M.P.K. Herath

Postgraduate Diploma (January to December 2023)

W.M.D.R.B. Rathnayake
S.N.B.M.C.L. Ranasinghe
N.C. Wijesundara
G.S.P. Gunarathna
S. Rajadurai
K.G.M. Jayanthi Menike
K. Sasikanth
W.M.N.C. Wijebandara
K.G.N.M. Gamage
H.E.M.U.C.S. Ekanayake
R.K.I.S. Jayawardhana
H.F. Ashwara
R.G.G.V.W. Randiwela
B.M.I.B. Balasooriya
G.K.G.S.D. Dissanayake
A.M.S.S. Senevirathne
FRM Riyaldeen
M.P.G.D. Lakshika
D.M.N. Abewardena
N.Venukopan
A.M.M. Siyath
H.M.S.D. Karalliyadda
T. Gopalakrishnan
M.P.G.D. Lakshika

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