



Biotechnology Industrial Training - 2026

Executive Summaries

BIT - 2026



Department of Biotechnology
Faculty of Agriculture and Plantation Management
Wayamba University of Sri Lanka



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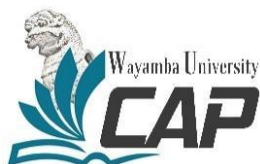
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- Deputy General Manager, Department of Quality Assurance, Martin Bauer Hayleys (Pvt.) Ltd., Blinkbonnie Estate, Dickoya, Sri Lanka.
- Additional Director, Plant Genetic Resources Centre, P.O. Box 59, Gannoruwa, Peradeniya, Sri Lanka.
- Research Professor, Molecular Microbiology and Human Diseases Research Programme, National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka.
- Chemist, Central Environmental Authority, North Central Provincial Office, Anuradhapura, Sri Lanka.
- Managing Director, Rasoda Dairies (Pvt.) Ltd., Beddegama, Bamunakotuwa, Kurunegala, Sri Lanka.
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- Senior Chemist, Regional Laboratory, National Water Supply and Drainage Board, Ampara, Sri Lanka.
- Assistant Manager, Department of Quality Assurance, Renuka Agri Foods PLC, Wathupitiwala, Sri Lanka.
- Senior Chemist, Regional Laboratory, National Water Supply and Drainage Board, Matara, Sri Lanka.
- Director General, Life Sciences Division, Sri Lanka Atomic Energy Board, Baseline Road, Orugodawatta, Wellampitiya, Sri Lanka.
- Head of the Division, Post Harvest Technology Division, National Aquatic Resources Research and Development Agency, Colombo 15, Sri Lanka.
- Research Fellow, Microbial Biotechnology Research Programme, National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka.
- Quality Assurance Manager, P.M. Mohommed Ali & Company (Pvt.) Ltd.,

- Mahagodella Estate, Ballapana, Minuwangoda, Sri Lanka.
- Head of Quality Assurance, Quality Assurance Department, Nestlé Lanka Limited, Kurunegala Factory, Makandura, Sri Lanka.
 - Director, Biotechnology Section, Research and Development Division, Industrial Technology Institute (ITI), No. 363, Bauddhaloka Mawatha, Colombo 07, Sri Lanka.
 - Director, Wewelwala Mills (Pvt.) Ltd., Bataganwila, Galle, Sri Lanka.
 - Officer-in-Charge, Seed Certification Service, Central Seed Testing Laboratory, Gannoruwa, Peradeniya, Sri Lanka.
 - Senior Project Manager, WHF Lighting and Building Materials (Pvt.) Ltd., Dehiwala, Sri Lanka.
 - Director/Chief Executive Officer, Hector Kobbekaduwa Agrarian Research and Training Institute, No. 114, Wijerama Mawatha, Colombo 07, Sri Lanka.
 - Deputy General Manager (Nutrition), Kosmo Feed Mills (Pvt.) Ltd., Hunugama, Bandarakoswatta, Sri Lanka.
 - Managing Director, Sri Biotech Lanka (Pvt.) Ltd., G&G Group, Mawathagama, Meepe, Padukka, Sri Lanka.
 - Assistant Manager – Laboratory, CBL Global Foods Ltd., No. 145, Colombo Road, Alawwa, Sri Lanka.
 - Executive Chemist, Department of Quality Control, Kelun Lifesciences (Pvt.) Ltd., Kandy Industrial Park, BOI Zone, Pallekele, Kandy, Sri Lanka.
 - General Manager (Production), Raigam Marketing Services (Pvt.) Ltd., No. 277, Koswatta, Kiriwaththuduwa, Sri Lanka.
 - Chemist, Regional Laboratory, National Water Supply and Drainage Board, Negombo, Sri Lanka.
 - Production and Human Resource Manager, Omega Green (Pvt.) Ltd., Mulleyaya Estate, Godigamuwa, Badalgama, Sri Lanka.
 - General Manager, American Premium Water Systems (Pvt.) Ltd., No. 243, Embulgama, Artigala, Hanwella, Sri Lanka.
 - Additional Director, Sustainable Agricultural Research and Development Centre (SARDC), Makandura, Gonawila (NWP), Sri Lanka.

Message from the Vice-Chancellor, Wayamba University of Sri Lanka



It is with great pleasure that I convey my warmest greetings and best wishes to the Department of Biotechnology on the publication of the **Biotechnology Industrial Training 2026 (BIT 2026) Executive Summaries Booklet**. Bringing together case study abstracts prepared by final-year students following their industrial training, this publication represents an important outcome of their academic and professional development.

Industrial training is an integral component of undergraduate education in Biotechnology, providing students with an invaluable opportunity to bridge theoretical knowledge and practical application in professional settings. Through this experience, students develop technical competencies, problem-solving abilities, professional discipline, teamwork, and the confidence required to meet the evolving demands of the biotechnology sector.

The case studies presented in this booklet demonstrate the students' efforts to engage with practical challenges, apply their academic knowledge, and gain firsthand experience in professional environments. Such exposure is essential in preparing graduates who are academically competent, innovative, adaptable, and responsive to the needs of industry and society.

The field of biotechnology continues to evolve rapidly across sustainable production, food and agriculture, healthcare, environmental management, and industrial innovation. Providing students with meaningful exposure to contemporary industrial practices is vital in preparing capable professionals who can contribute creatively and responsibly to national development and sector advancement. I trust that the experiences gained through BIT 2026 will inspire our students to pursue excellence, lifelong learning, and innovation in their future endeavors.

I commend the academic staff of the Department of Biotechnology for their commitment to mentoring students and for their contribution to compiling this publication. I also gratefully acknowledge the support and cooperation extended by the partner institutions and organizations that provided meaningful industrial exposure.

I congratulate all students featured in this booklet and commend their dedication and achievements. I am confident that the knowledge, skills, and professional experiences gained through their training will serve as a strong foundation for their future careers and contributions to biotechnology.

I wish the Department of Biotechnology continued success in its academic and professional endeavors and extend my best wishes to all students for a bright and successful future.

Prof. E. M. P. Ekanayake

The Vice-Chancellor | Wayamba University of Sri Lanka

Message from the Dean, Faculty of Agriculture and Plantation Management



It is with great pleasure that I extend my warmest greetings to the *BIT 2026 Executive Summaries Booklet* of the Department of Biotechnology. Bringing together the case studies of forty final-year students, this booklet marks a significant milestone in their academic journey.

Industrial training is where classroom learning meets the realities of the professional workplace. In laboratories, factories and research centres, our students saw how science becomes products, processes and services that serve people: safer food, healthier lives, stronger farms and a cleaner environment. They gained hands-on experience in good practice, quality assurance and biosafety, while strengthening their analytical thinking, problem-solving and teamwork. Behind every case study is a young person who stepped into an unfamiliar place and grew in confidence.

Our Faculty is firmly committed to developing well-rounded graduates who combine sound knowledge and professional competence with strong ethical values, adaptability and confidence. These generic graduate attributes reflect our belief that education must shape responsible, innovative and socially conscious individuals.

I sincerely thank our industry partners, training supervisors, and mentors for opening their doors and generously sharing their knowledge and experience with our students. My heartfelt appreciation also goes to Dr. Priyanwada Warakagoda, Head of the Department; Dr. Dileepa Liyanage, In-plant Training Coordinator; and all academic staff and members of the editorial team of the Department of Biotechnology for their dedication and commitment to making this initiative a success.

To our students: we are proud of you. Reflect honestly on what you have learned, value the relationships you have built, and let integrity, curiosity and compassion guide your careers.

May BIT 2026 strengthen academia–industry collaboration and inspire science that makes a difference. I wish the IPT Presentation Day every success.

Prof. Bandara Gajanayake
Dean | Faculty of Agriculture and Plantation Management

Message from the Head, Department of Biotechnology



In-plant training is an integral part of undergraduate education, helping students translate academic knowledge into practical skills in professional settings. For students specializing in Biotechnology, training opportunities extend beyond biotechnology-specific industries to encompass diverse agricultural, biological, scientific, technical, and industrial settings. These experiences provide valuable exposure to agricultural production and processing, laboratory operations, quality assurance, environmental management, research, and other relevant fields, highlighting the contribution of biotechnology and related sciences to

sustainable development.

It is with great pleasure that I acknowledge this collection of forty student case study abstracts, reflecting the knowledge, practical insights, and professional experiences gained through the in-plant training programme. The abstracts represent diverse training placements in agricultural enterprises, laboratories, processing facilities, research institutions, and other relevant organizations. They demonstrate students' efforts to connect academic learning with practical applications while developing technical competence, critical thinking, and problem-solving skills.

I extend my sincere appreciation to our partner organizations in the government and private sectors for providing valuable training opportunities and professional guidance. I wish to express my sincere appreciation to the Vice-Chancellor, Professor Piyal Ekanayake, and the Dean of the Faculty of Agriculture and Plantation Management, Professor Bandara Gajanayake, for their valued support, encouragement, and kind facilitation towards the successful completion of this publication. My sincere thanks go to Dr. Dileepa Liyanage, In-Plant Training Coordinator, for his dedicated coordination; the academic staff for their guidance and supervision; and the academic-supportive and non-academic staff for their valuable assistance.

I trust that these experiences will strengthen our students' professional readiness and inspire them to contribute meaningfully to the advancement of agriculture, biotechnology, and related industries in Sri Lanka.

Dr. Priyanwada Warakagoda
Head | Department of Biotechnology

Message from the In-Plant Training Coordinator



It is my great pleasure to deliver this message for the executive summary collection, “Biotechnology Industrial Training 2026 (BIT – 2026).” This volume documents the practical experiences, problem-solving initiatives, and achievements of our undergraduates as they transitioned from the lecture hall and laboratory into professional work environments across Sri Lanka. From July to October 2026, our trainees engaged with leading commercial enterprises, national research institutes, and regulatory bodies, translating their foundational knowledge in biotechnology into practical solutions for real-world industrial and scientific challenges.

The forty case studies compiled in this publication reflect the versatility of modern biotechnology and allied sciences spanning plant tissue culture and germplasm conservation, food and pharmaceutical quality assurance, water and environmental management, agricultural value addition, and digital laboratory tools. Each summary demonstrates our students' ability to observe operational bottlenecks, design structured interventions, and contribute meaningfully to organizational efficiency, quality, and sustainability.

I extend my sincere appreciation to our industry partners and external supervisors for opening their facilities and providing dedicated mentorship to our undergraduates. My heartfelt gratitude is also extended to the Vice-Chancellor of Wayamba University of Sri Lanka, the Dean of the Faculty of Agriculture and Plantation Management, the Head of the Department of Biotechnology, the Editorial Board, the Panel of Reviewers, and both the academic and non-academic staff of the Department for their steadfast support in bringing this training programme and publication to fruition.

To our students, take pride in the dedication and professionalism you have demonstrated throughout your placement. May the technical competence, adaptability, and work ethic you have cultivated during this training serve as a strong foundation as you embark on your future careers in biotechnology and beyond.

Dr. D.S. Liyanage

In-Plant Training Coordinator – 2026 | Department of Biotechnology

Table Of Contents

Development And Evaluation Of Low-Cost Coir-Based Grow Bag Media Using Coir Processing Waste	
L.K.Y. Bimsara.....	1
Evaluation Of Pre-Hardening Acclimatization Treatments For Improving The Survival And Vigor Of Weak Tissue-Cultured Plants	
E.G.R.D. Chandrasena.....	2
Development Of A Cost-Effective Ms-Albert Hybrid Medium For Banana Tissue Culture In Small-Scale Laboratories	
E.P.Y.W. Ethugala	3
Implementation Of Printed Metal Tins For Process Optimization In Sweetened Condensed Milk Production	
D.K.S. Hettiarachchi	4
Evaluation Of Potting Media For Improving Survival Of Tissue-Cultured Cavendish Banana Plantlets During <i>Ex Vitro</i> Hardening	
T.P.G.I.R. Jayarathne.....	5
Variations In Milk Fat Content And Lactometer Reading In Raw Milk By Different Suppliers	
D.K.M.K. Karunarathna.....	6
Caking In A Cinnamon Fertilizer Blend: Evaluation Of Kieserite As A Replacement For Dolomite	
M.A.O. Manoshika	7
Association Of Environmental Factors With Microbiological Monitoring In A Microbiology Laboratory At Martin Bauer Hayleys (Pvt) Ltd	
Millenshiyani Jesiah.....	8
Qr Code Based Digital Tracking System For Inventory And Status Management Of Tissue Culture Vessels At The Plant Genetic Resources Centre	
S.T. Navodya	9
Measuring Culturable Bacterial Load Using An Andersen Cascade Impactor At The Gohagoda Municipal Solid Waste Dump Site, Kandy	
U.J. Nishshanka	10
Assessment Of The Performance Of An Open Pond Wastewater Treatment System	
D.P.H.N. Pathirana	11

Comprehensive Risk Assessment Of The Whole Kernel White Coconut Oil Production Process	
W.K.K.I.K. Rathnayaka.....	12
Feasibility Of Solar Greenhouse Sludge Drying As An Alternative To Centrifugation At Konduwattuwana Water Treatment Plant	
A.R.F. Ristha.....	13
Optimized Hot Water Washing Temperature To Reduce Microbial Contamination On Coconut Kernels In An Organic Coconut Processing Plant	
K.G.U. Sandeepani.....	14
Optimization Of Alum Dosage For Turbidity Removal In Raw Water At Thihagoda Water Treatment Plant	
M.D.T.H. Vithanachchi.....	15
Management Of Blackish Foliar Discoloration In <i>Scindapsus Pictus</i> Using Calcium Nitrate And Magnesium Sulphate	
W.M.S.S. Wimalaweera	16
Optimization Of Carbohydrate-Rich Fraction Isolation From Kithul Treacle (<i>Caryota Urens</i>) For Stable Carbon Isotope ($\Delta^{13}\text{C}$) Analysis	
B.S.N. Mendis.....	17
Developing A Compliant Hazardous Laboratory Waste Management Protocol For The National Aquatic Resources Research And Development Agency	
K.D.H. Silva.....	18
Comparative Evaluation Of Kjeldahl And Chns/O Elemental Analysis: Analytical Performance, Usability, And Operational Guidance	
B.U.C.P.N. Abeywardhana	19
Development And Proposed Validation Of A Mobile Rgb Sensor Application For Accession-Specific Tomato (<i>Solanum Lycopersicum</i> L.) Fruit Maturity Detection	
R.K.S. Binoda.....	20
Evaluating The Impact Of Semolina Particle Size Variation On The Length Uniformity Of Extruded Pasta	
H.L.D. Perera	21
Assessment Of Marigold Varieties For Suitability In Mutation Breeding	
N.S. Samaraweera.....	22
Multi-Modal Sensing Mobile App For Accession-Specific Watermelon (<i>Citrullus</i>	

<i>Lanatus</i>) Physiological Maturity And Flesh Colour Detection	
M.G.D. Samadhi	23
Development Of A Biotechnology Product Portfolio And Technical Marketing Framework For Bird Nova Scientific (Pvt) Ltd	
C.B. Sewwandi	24
Development And Validation Of An Alternative Cleaning Chemical Through Microbiological And Quality Assessment	
H.M.M.D. Herath	25
Development Of A Low-Cost Chemical Inventory And Equipment Calibration Tracking System For Laboratory Management	
M.A.H.I.M. Perera	26
Assessment And Proposed Design Of An In-House Quality Control Laboratory Framework For Wewelwala Mills (Pvt) Ltd	
S.S.W. Denipitiya	27
Minimization Of Water Wastage In Manual Bottling Operations: An Automated Alternating Flow-Control Retrofit	
H.P.S. Namina	28
Validation Of Germination And Vigour Criteria For Determining The Storage Period Of Certified Seed Paddy Varieties In Sri Lanka	
P.G.A. Najeeb	29
Feasibility Of Uv-C Sterilisation Lighting As A Diversification Pathway For A Lighting And Designing Company In Sri Lanka	
M.H.F. Fasra	30
Structural Barriers To Good Agricultural Practices (GAP) Adoption Among Fruit And Vegetable Producers In Sri Lanka	
K.S.A. Premaweera	31
Regional Variation In The Nutritional Composition And Metabolizable Energy Of Rice Polish Used In Animal Feed Formulation	
M.T.F. Thaheera	32
Assessment Of Coconut Milk Ph Variation Among Different Sourcing Areas And Proposed Quality Control Measures	
G.R.D.P. Menike	33
Evaluation Of <i>Trichoderma Harzianum</i> And <i>Phanerochaete Chrysosporium</i> For	

Efficient Composting Of Coir Dust, Paddy Husk And Chicken Manure Mixture	
M.M.M. Leena.....	34
Design Of A Population-Level Smart Field Iso-Cage To Prevent Cross-Pollination Among Solanaceae Accessions At The Plant Genetic Resources Centre	
T.P.H.P. Indrasiri.....	35
Development Of A Supplementary Guide For Instrument Operation And Data Processing Using Shimadzu Labsolutions Software For FTIR, AAS And HPLC	
H.M.G.P. Herath	36
Analysis Of Factors Contributing To High Returns Of Soya Products And Proposed Improvement Strategies	
W.D.S.U. Dharmasiri.....	37
Optimization Of Alum Dosage For Turbidity Removal From High-Turbidity Ma Oya Raw Water	
W.K.D.T. Waththage.....	38
Evaluation Of Long-Term Control Sample Management And Quantity Variation In Raw Material Quality Control	
B. N. D. Bogahapitiya	39
Development Of A Digital Research Archive For Easy Access To Organic Farming And Agro-Ecology Information At Sardc, Makandura	
R.D.K. Dilshan	40

DEVELOPMENT AND EVALUATION OF LOW-COST COIR-BASED GROW BAG MEDIA USING COIR PROCESSING WASTE

L.K.Y. BIMSARA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Coir fine dust and coir fibre are major waste streams generated during coir processing at Eco Trends (Pvt) Ltd, whereas coir peat is a comparatively high-cost component used in polytunnel growing media. This study evaluated the potential of coir-processing by-products to develop cost-effective grow bag media for cultivation in the polytunnel at the Vegemate project site. Nine growing media formulations (T1-T9) were prepared using varying proportions of coir peat, coir fine dust, coir fibre, 18 mm coco chips (10 C), and paddy husk charcoal. Each formulation was standardized to 900 g dry mass per 20 × 20 cm grow bag, with T4 containing 40% coir peat serving as the control. Initial electrical conductivity (EC) of the media ranged from 2.0 to 3.0 mS/cm. All formulations were washed until EC was reduced below 0.5 mS/cm. Yard-long bean (*Vigna unguiculata* subsp. *sesquipedalis*) was used as the test crop. Fertilization, pesticide application, irrigation, and other crop management practices were maintained uniformly across all treatments. Plant performance was assessed based on the number of leaves, water-holding capacity, canopy size, and lateral root-zone development at 53 days after sowing. T5 and T9, containing 40% and 60% coir fine dust, respectively, showed promising growth performance comparable to that of the control. These findings indicated that coir fine dust has potential to partially replace coir peat in polytunnel grow bag media, offering an opportunity to reduce growing-media costs, utilize industrial by-products, and minimize waste-disposal challenges.

External Supervisor: Ms. W.A.T. Fernando, Junior Executive, Agri and Research Innovation, Eco Trends (Pvt) Ltd. Walaliya, Ginimanna, Bamunakotuwa.

Internal Supervisor: Snr. Prof. N.S. Kottearachchi, Senior Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

EVALUATION OF PRE-HARDENING ACCLIMATIZATION TREATMENTS FOR IMPROVING THE SURVIVAL AND VIGOR OF WEAK TISSUE-CULTURED PLANTS

E.G.R.D. CHANDRASENA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The Floriculture Research and Development Unit of the Department of National Botanic Gardens, Peradeniya, mass-propagates ornamental plants, including Anthurium (*Anthurium andraeanum*), for commercial distribution. During propagation, many tissue-cultured plants become contaminated with microorganisms during *ex vitro* transfer and are discarded, causing significant loss of planting material. This study evaluated pre-hardening acclimatization treatments to improve the survival and vigor of weak tissue-cultured *A. andraeanum* plants. The experiment consisted of three treatments, each with seven replicates. In the control, plants were washed with tap water followed by a warm water wash. In Treatment 1, plants received the same washing procedure followed by a fungicide application at 2 g/L. In Treatment 2, plants were washed similarly and treated with a different fungicide at 2 g/L. All plants were potted in a 1:1:1 mixture of chips, coir dust and charcoal, supplemented with 'Growmore' fertilizer at 2 g/L, and acclimatized under nursery conditions. Survival and growth performance were recorded weekly during acclimatization. Among the weak plants, those receiving Treatment 1 showed a higher survival rate than the control, whereas plants receiving Treatment 2 developed a yellowish discoloration. These observations suggest Treatment 1 is the most suitable pre-hardening treatment for improving the survival and vigor of tissue-cultured Anthurium plants, reducing planting material losses and improving commercial propagation efficiency at the Unit.

External Supervisor: Ms. P.A.A.P.K. Senanayake, Deputy Director, Floriculture Research and Development Unit, Department of National Botanic Gardens, Peradeniya.

Internal Supervisor: Snr. Prof. N.S. Kottearachchi, Senior Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

DEVELOPMENT OF A COST-EFFECTIVE MS–ALBERT HYBRID MEDIUM FOR BANANA TISSUE CULTURE IN SMALL-SCALE LABORATORIES

E.P.Y.W. ETHUGALA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Plant tissue culture enables the rapid production of disease-free, genetically uniform planting materials. However, the high cost of Murashige and Skoog (MS) medium remains a major challenge for small-scale tissue culture laboratories. This study was conducted at Reo Growers (Pvt) Ltd, a plant tissue culture laboratory specializing in banana micropropagation, to evaluate a cost-effective alternative for media preparation. A hybrid medium was developed and assessed by partially replacing MS salts with Albert solution, a lower-cost nutrient source containing essential macro- and micronutrients, to reduce media costs while maintaining satisfactory plant growth. For shoot proliferation, media containing $\frac{1}{2}$ MS + $\frac{1}{2}$ Albert solution supplemented with vitamins, 6-Benzylaminopurine, Naphthaleneacetic acid, sugar, and agar were prepared, while rooting media consisted of $\frac{1}{2}$ MS + $\frac{1}{2}$ Albert solution supplemented with vitamins, IBA, sugar, and agar. Growth performance was evaluated by observing contamination levels, rooting, shoot elongation, and leaf development compared to cultures on conventional MS medium. Results showed that explants on the MS–Albert hybrid medium exhibited healthy growth with normal rooting, shoot elongation, and leaf development. Contamination levels remained low and comparable to those observed in MS medium. Furthermore, the hybrid medium reduced media preparation costs by approximately 30–40%, enabling the establishment of a greater number of cultures without compromising plant growth.

External Supervisor: *Mr. D.M.R.B. Disanayaka, Director, Reo Growers (Pvt) Ltd, No. 101, Palamugedara, Maho.*

Internal Supervisor: *Snr. Prof. N.S. Kottearachchi, Senior Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

IMPLEMENTATION OF PRINTED METAL TINS FOR PROCESS OPTIMIZATION IN SWEETENED CONDENSED MILK PRODUCTION

D.K.S. HETTIARACHCHI

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Sweetened condensed milk (SCM) production at Nestlé Lanka Kurunegala factory traditionally utilizes unprinted metal tins, followed by the external application of product labels. The existing process also employs flame sterilization for tin sterilization, which presents operator safety concerns. Additionally, external labelling costs approximately LKR 15 million annually. Therefore, this study evaluated infrared (IR) sterilization as an alternative to flame sterilization and the feasibility of replacing unprinted tins with printed tins. The effectiveness of the IR sterilization system was evaluated using *Aspergillus brasiliensis*, a fungal organism used for microbiological process validation. The test organism was inoculated onto the internal surfaces of tins at an initial concentration of 1.4×10^6 CFU/mL. The inoculated tins were then subjected to IR sterilization under specified conditions. Following sterilization, samples were collected and cultured on Dichloran 18% Glycerol (DG18) agar to assess the presence of viable fungi. The microbial count following IR sterilization was observed as <1 CFU, satisfying the company's specified microbiological acceptance criteria with effective microbial inactivation. Additionally, no heat-induced damage or deformation was observed in the printed metal tins following IR sterilization. The findings support the effectiveness of IR sterilization, while implementing printed tins eliminates external labelling costs. Overall, this case study demonstrates process optimization to enhance microbiological safety, occupational safety, and cost efficiency in SCM production.

External Supervisor: *Mr. M.K. Silva, Assistant Manager, Application Group, Nestlé Lanka Limited, Kurunegala Factory, Sri Lanka.*

Internal Supervisor: *Snr. Prof. N.S. Kottearachchi, Senior Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

EVALUATION OF POTTING MEDIA FOR IMPROVING SURVIVAL OF TISSUE-CULTURED CAVENDISH BANANA PLANTLETS DURING *EX* *VITRO* HARDENING

T.P.G.I.R. JAYARATHNE

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

High mortality of tissue-cultured Cavendish banana plantlets during *ex vitro* hardening is a major problem at the CIC Plant Nursery, causing considerable losses and increased production costs. This case study evaluated different potting media to improve plantlet survival and identify an economically feasible medium for initial acclimatization. Six potting media (T1-T6) were evaluated using 20 plantlets per treatment. The existing nursery medium, consisting of charcoal, paddy husk and topsoil (2:2:1), was used as the control (T1). The alternative media were T2 (coir dust and sand, 2:1), T3 (carbonized paddy husk and coir dust, 1:1), T4 (coir dust, compost, and sand, 1:1:1), T5 (commercially available Jiffy pellets), and T6 (coir dust and compost, 2:1). All plantlets were maintained under standard nursery conditions with watering twice daily and weekly application of Albert solution. After two weeks, plantlet survival was assessed and media costs for high-survival treatments were compared. T5 recorded the highest survival rate (100%), followed by T3 (90%) and T2 (80%). In contrast, the control showed 25% survival, while T4 and T6 recorded 10% and 0%, respectively. Although T5 achieved the highest survival, its commercial nature incurs higher costs, whereas carbonized paddy husk in T3 can be prepared locally. Considering both survival and cost, T3 showed potential as a cost-effective and economically feasible medium for improving early survival during *ex vitro* hardening of tissue-cultured Cavendish banana plantlets.

External Supervisor: Mr. C. Niroshana, Executive – Quality Assurance, CIC Agribusiness (Pvt) Ltd, Pelwehera, Dambulla.

Internal Supervisor: Snr. Prof. N.S. Kottearachchi, Senior Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

VARIATIONS IN MILK FAT CONTENT AND LACTOMETER READING IN RAW MILK BY DIFFERENT SUPPLIERS

D.K.M.K. KARUNARATHNA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

At Rasoda Dairies (Pvt) Ltd, raw milk quality assessment is essential to ensure processing suitability, product consistency, and compliance with quality standards. Fat Content (FC) and Lactometer Reading (LR) are key physicochemical parameters for raw milk acceptance and quality-based payments. This study evaluated FC and LR variations in farmer-supplied raw milk contributing factors, possible adulteration, and quality improvement measures. FC and LR data were collected from raw milk supplied by eight farmers over 25 days and evaluated against the company's specified quality ranges. Of the 172 milk samples, only 15 (8.7%) complied with the specified ranges for both FC and LR. A total of 47 (27.3%) samples deviated in both parameters, while 110 (64.0%) deviated in one parameter. Five farmers consistently supplied milk with both FC and LR within the acceptable ranges, whereas the rest frequently supplied milk below the acceptable range. Observed variability may be attributed to intrinsic factors such as breed, lactation stage, feeding regime, and physiological condition, alongside sampling, handling, and storage practices. Adulteration was assessed using Reagent Strips for Detection of Adulteration together with a chemical reagent-based adulteration test kit, which indicated the possible presence of soda and salts in 5.8% of the milk samples tested. Routine acidity and adulteration testing, standardized sampling and handling, adequate chilling, and farmer training on good feeding and milking practices are recommended to strengthen raw milk quality.

External Supervisor: *Ms. G.D.M.S. Dissanayaka, Quality Executive, Rasoda Dairies (Pvt) Ltd, Beddegama, Bamunakotuwa, Kurunegala.*

Internal Supervisor: *Dr. K.M. Mewan, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

CAKING IN A CINNAMON FERTILIZER BLEND: EVALUATION OF KIESERITE AS A REPLACEMENT FOR DOLOMITE

M.A.O. MANOSHIKA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Caking is a common physical quality problem in blended fertilizers, forming hard agglomerates that negatively affect handling, storage, and application. Caking was observed in a newly formulated CIC cinnamon fertilizer blend containing sulphate of ammonia (SOA), Eppawala Rock Phosphate (ERP), muriate of potash (MOP), and dolomite; therefore, this study investigated its cause and evaluated a suitable solution. Initial investigations assessed the moisture content, particle size, physical appearance, degree of caking/hardness, and compatibility of the raw materials and fertilizer blend. In progressive raw material compatibility tests, no caking was observed in the SOA + ERP and SOA + ERP + MOP combinations, whereas noticeable caking occurred after adding dolomite. Thus, dolomite was identified as the cause of caking. Since dolomite primarily supplied magnesium (Mg), kieserite was selected as an alternative Mg source. A replacement trial was subsequently conducted by substituting dolomite with a Mg-equivalent amount of kieserite in the fertilizer formulation. The blend containing dolomite developed noticeable caking within five days, while the blend containing kieserite showed no visible caking throughout the four-week observation period. Therefore, replacement of dolomite with kieserite was identified as a suitable approach for mitigating the caking problem while maintaining Mg supplementation in the cinnamon fertilizer blend. This study demonstrates a practical approach for identifying the source of caking and improving the physical stability of blended fertilizer formulations.

External Supervisor: *Mr. W.G.C. Vibhushana, Asst. Manager, CIC Agri Businesses Private Limited, 81/14, New Nuge Road, Peliyagoda, Kelaniya.*

Internal Supervisor: *Prof. B.L.W.K. Balasooriya, Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

ASSOCIATION OF ENVIRONMENTAL FACTORS WITH MICROBIOLOGICAL MONITORING IN A MICROBIOLOGY LABORATORY AT MARTIN BAUER HAYLEYS (PVT) LTD

MILLENSHIYANI JESIAH

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Maintaining suitable environmental conditions is essential for accurate and reliable microbiological results. This study assessed the relationship of temperature and relative humidity (RH) with microbiological monitoring results in the microbiology laboratory at Martin Bauer Hayleys (Pvt) Ltd over 24 sampling days (19th August–25th September 2026) in the Media Preparation, Laminar Flow, Incubator, and Cleaning Rooms. Open-plate and surface-swab methods (one area sampled daily) were used to determine Total Plate Count (TPC) and Yeast and Mold Count (YMC). Personal hygiene and aseptic practices remained satisfactory. Temperature ranged from 20.6 to 25.7 °C, and RH from 57 to 82% (highest RH in the Cleaning Room). Spearman correlation analysis showed no significant associations between temperature and open-plate TPC ($\rho = 0.201$, $p = 0.345$), open-plate YMC ($\rho = 0.282$, $p = 0.182$), or surface-swab TPC ($\rho = 0.283$, $p = 0.180$), except for a significant positive correlation with surface-swab YMC ($\rho = 0.423$, $p = 0.039$). RH showed no significant correlations with open-plate TPC ($\rho = -0.069$, $p = 0.747$), open-plate YMC ($\rho = 0.212$, $p = 0.320$), surface-swab TPC ($\rho = -0.068$, $p = 0.753$), or surface-swab YMC ($\rho = -0.130$, $p = 0.545$). Overall, temperature and RH showed no significant associations with most microbiological parameters; however, longer-term monitoring with a larger dataset is recommended to identify environmental variations and their relationships with microbiological contamination to support effective preventive controls.

External Supervisor: *Mr. G. Buddhika, Deputy General Manager, Department of Quality Assurance, Martin Bauer Hayleys Private Limited, Blink Bonnie, Dickoya.*

Internal Supervisor: *Prof. B.L.W.K. Balasooriya, Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

QR CODE BASED DIGITAL TRACKING SYSTEM FOR INVENTORY AND STATUS MANAGEMENT OF TISSUE CULTURE VESSELS AT THE PLANT GENETIC RESOURCES CENTRE

S.T. NAVODYA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The *In vitro* Conservation and Biotechnology Unit of the Plant Genetic Resources Centre, Gannoruwa, conserves vegetatively propagated and recalcitrant-seeded crop species, including *Dioscorea*, innala, sweet potato, and banana, through slow-growth *in vitro* culture under aseptic conditions in glass vessels. Currently, these vessels are tracked using manual paper-based labelling that records only basic details such as accession number and culture date, failing to capture comprehensive, real-time status information required for effective germplasm management. This study developed and implemented a QR code-based digital tracking system for efficient inventory and status management of tissue culture vessels in *in vitro* germplasm conservation. Each vessel is assigned a unique QR code linked to a centralized digital database, enabling laboratory personnel to instantly access and update key information, including plant species, culture initiation date, rack number, accession number, vessels per accession, media type, contamination status, and subculturing state, by simply scanning the code with a mobile device. The system facilitates rapid and streamlined data entry and retrieval, reduces manual record-keeping errors, improves traceability, and supports timely decision-making regarding subculturing schedules and contamination management. The developed system provides a simple, low-cost, and scalable approach for digitizing tissue culture inventory management that can be adapted to other tissue culture and germplasm conservation facilities.

External Supervisor: Dr. (Ms.) D.G.C. Jeewani, Additional Director, Plant Genetic Resources Centre, Gannoruwa.

Internal Supervisor: Prof. B.L.W.K. Balasooriya, Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

MEASURING CULTURABLE BACTERIAL LOAD USING AN ANDERSEN CASCADE IMPACTOR AT THE GOHAGODA MUNICIPAL SOLID WASTE DUMP SITE, KANDY

U.J. NISHSHANKA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Municipal solid waste (MSW) dump sites release airborne culturable bacteria and bioaerosols during waste handling and decomposition, posing occupational and public health risks. Under an airborne microplastics, microbes, and antibiotic resistance genes investigation by the National Institute of Fundamental Studies (NIFS), Kandy, at the Gohagoda MSW dump site, culturable bacterial load was measured using a single-stage Andersen cascade impactor (28.3 L/min, 15 min/sample) on LB agar. Sampling covered ten indoor and outdoor zones: entrance, plastic recycling, non-biodegradable waste separation, and compost production centres, model farm, and nearby houses. Colonies were enumerated and grouped by morphology, with total concentrations ranging from 96 CFU/m³ (model farm, indoor) to 694 CFU/m³ (plastic recycling, indoor). Of eight identified morphotypes, A1, A2, and A3 occurred in all zones and were the most abundant. Outdoor non-biodegradable waste, compost, and model farm zones recorded higher loads than indoors. Challenges included handling/transport contamination, distinguishing fungi from bacteria on non-selective media, and single-day weather variability. Using sealed plates with unexposed negative controls, parallel plating on fungal-selective media with Gram staining, and multi-day sampling with meteorological recording are proposed to strengthen bioaerosol exposure assessments at waste management facilities.

External Supervisor: *Prof. D. Magana-Arachchi, Research Professor/Head, Molecular Microbiology and Human Diseases Project, National Institute of Fundamental Studies (NIFS), Hantana Road, Kandy.*

Internal Supervisor: *Prof. B.L.W.K. Balasooriya, Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

ASSESSMENT OF THE PERFORMANCE OF AN OPEN POND WASTEWATER TREATMENT SYSTEM

D.P.H.N. PATHIRANA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Among wastewater treatment techniques for mitigating the environmental impacts of industrial effluents, open pond systems provide the advantage of utilizing natural treatment processes. This study assessed the performance of an existing open pond system, where relatively high biochemical oxygen demand (BOD) and total suspended solids (TSS) were recorded for the treated effluent compared to maximum permissible levels. This system comprises six interconnected ponds, a sand filter, cascade aerators and a maturation pond, designed to treat sanitary effluents. Following non-compliant laboratory results, a field observation was conducted to assess treatment plant performance. Although treated water from the facultative ponds passes through a filtration unit, high TSS content was observed, likely due to filter clogging; therefore, effective algal sedimentation before filtration is necessary. Furthermore, the wastewater retention time within the ponds and periodic sludge removal should be carefully monitored. The existing cascade aeration system may not provide sufficient aeration; therefore, increasing the effective length and number of cascade steps is recommended. Additionally, the maturation pond was covered with invasive plants, which may restrict atmospheric oxygen transfer and sunlight penetration; since this adversely affects natural treatment processes, the vegetation should be removed. The study highlights the importance of regular monitoring and maintenance to improve treatment efficiency and ensure the discharge of acceptably treated effluent.

External Supervisor: *Dr. T.D. Fernando, Chemist, Central Environmental Authority, North Central Provincial Office, Anuradhapura.*

Internal Supervisor: *Prof. B.L.W.K. Balasooriya, Professor, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

COMPREHENSIVE RISK ASSESSMENT OF THE WHOLE KERNEL WHITE COCONUT OIL PRODUCTION PROCESS

W.K.K.I.K. RATHNAYAKA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Dasa Cocos (Pvt) Ltd is a prominent coconut-based products manufacturing and exporting company located in Moonamaldeniya, Kuliyaipitiya, Sri Lanka. Whole Kernel White Coconut Oil (WKWCO) is one of the main products of the company. The production process involves receiving coconuts, sorting and washing, deshelling, grinding, drying, expelling, filtering, and storage. Each stage carries potential biological, chemical, and physical risks that can affect product safety, quality, and worker safety. This case study was conducted to perform a comprehensive risk assessment of the WKWCO production process. Risks were identified at each process step, possible causes were recognized, and existing control measures were recorded. Risk scores were calculated using the formula $\text{Risk Score} = \text{Likelihood} \times \text{Severity}$, and risks were classified according to the standard risk matrix. The assessment showed that the majority of the process steps were at a low or medium risk level. High-risk hazards were mainly limited to microbial contamination during washing of kernels and mould growth during drying. The company already maintains good controls such as regular cleaning schedules, visual inspection, temperature and moisture monitoring, and hygiene practices. Additional control measures were recommended based on the Hierarchy of Controls, with special emphasis on proper training of workers to prevent operational errors. The study confirmed that the company follows satisfactory food safety practices, and the Risk Assessment Record can further support continuous improvement in the quality and standard of the WKWCO production process.

External Supervisor: *Mr. G.M.M.N. Gaspe, Factory Manager, Dasa Cocos (Pvt) Ltd, Moonamaldeniya, Kuliyaipitiya.*

Internal Supervisor: *Dr. K.M. Mewan, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

FEASIBILITY OF SOLAR GREENHOUSE SLUDGE DRYING AS AN ALTERNATIVE TO CENTRIFUGATION AT KONDUWATTUWANA WATER TREATMENT PLANT

A.R.F. RISTHA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The Konduwattuwana Water Treatment Plant in Ampara District generates around 390 m³/day of wastewater, requiring efficient dewatering, drying, and disposal. The plant operates four conventional sludge drying beds (~113 m², 136 m³ capacity each); however, conventional drying requires ~12 weeks, prolonging bed occupancy and limiting capacity. Consequently, mechanical dewatering using an Alfa Laval Aldec G2-60 centrifuge (~16.5 m³/h feed rate, 1.7–3.5% solids, 80–120 ppm polymer at 1.9 kg/day) is employed for 6–8 h/day, four days/week, incurring considerable energy and operational costs. Therefore, this study assessed the technical and economic feasibility of a multi-level solar greenhouse system as a sustainable alternative to mechanical centrifugation and conventional drying beds. The proposed system integrates solar-assisted evaporation, solar-powered ventilation, and four vertically stacked drying platforms to increase effective drying area while minimizing land requirements. The system is expected to reduce electricity and polymer consumption, accelerate drying, and improve drying-bed utilization. This proposed multi-level solar greenhouse is expected to reduce sludge drying time from approximately 12 weeks to 2 - 4 weeks and achieve an estimated 50% reduction in sludge management costs through reduced electricity consumption, polymer usage, manpower and mechanical maintenance. These outcomes will be evaluated through technical and economic feasibility assessments to determine the suitability of the proposed system as a cost-effective and sustainable alternative.

External Supervisor: *Mr. S.P.U. Kumara, Senior Chemist, Regional Laboratory, National Water Supply and Drainage Board, Ampara.*

Internal Supervisor: *Dr. K.M. Mewan, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

OPTIMIZED HOT WATER WASHING TEMPERATURE TO REDUCE MICROBIAL CONTAMINATION ON COCONUT KERNELS IN AN ORGANIC COCONUT PROCESSING PLANT

K.G.U. SANDEEPANI

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

At Renuka Agri Foods (Pvt) Ltd, a certified organic coconut-processing facility, chemical sanitizers are restricted to maintain organic compliance. During processing, coconuts undergo dehushing, deshelling, kernel peeling, paring, and rotary washing before milk extraction, pasteurization, and storage. High microbial contamination in extracted milk posed risks to hygiene, pasteurization, and storage stability; kernels were identified as the probable source, with swab tests confirming high microbial loads even after rotary washing. Therefore, a chemical-free thermal washing intervention was developed using steam generated by burning crushed coconut shells, a factory by-product. Since thermal washing can cause kernel fat loss, temperature optimization established that washing at 85 °C limited fat loss to 1.5% while reducing kernel microbial counts by two log cycles (100-fold). Milk extracted from thermally washed kernels and pasteurized showed no detectable deviation in quality parameters following storage for 24 hours at 10 °C. These findings indicate that steam-assisted hot water washing at 85 °C could serve as a practical, cost-effective, chemical-free microbial control intervention compatible with organic coconut-processing requirements. Further studies are recommended over extended storage periods to establish its effectiveness and reproducibility.

External Supervisor: *Mr. N.D. Dias, Assistant Manager, Department of Quality Assurance, Renuka Agri Foods PLC, Wathupitiwala.*

Internal Supervisor: *Dr. K.M. Mewan, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

OPTIMIZATION OF ALUM DOSAGE FOR TURBIDITY REMOVAL IN RAW WATER AT THIHAGODA WATER TREATMENT PLANT

M.D.T.H. VITHANACHCHI

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The Thihagoda Water Treatment Plant (TWTP), operated by the National Water Supply and Drainage Board (NWSDB), supplies treated water to ~90,000 consumers using raw water from the Thihagoda tube well. In 2026, higher average raw water turbidity than in 2025 increased loading on the existing slow sand filtration system and raised operational and maintenance costs. Since alum is routinely used as a coagulant to remove suspended and colloidal particles causing turbidity and color, this study aimed to determine the minimum effective alum dosage at TWTP to minimize chemical consumption, filter loading, and treatment costs while complying with Sri Lanka Standards Institution (SLSI) drinking-water standards. Jar tests were conducted using six raw water samples treated with 5-30 ppm of a 1% (w/v) alum solution to determine the optimum dosage based on turbidity removal efficiency. An alum dosage of 15 ppm achieved approximately 99% turbidity removal, reducing turbidity to 2.53 Formazin Nephelometric Units, the lowest value recorded among the tested dosages. The findings demonstrate the potential of alum-dose optimization to improve coagulation efficiency and reduce excessive loading of downstream filtration units. Additional treatment processes, including optimized filtration and aeration, are recommended to further improve treated water quality and ensure consistent compliance with applicable drinking water standards.

External Supervisor: *Mrs. S. Livera, Senior Chemist, Regional Laboratory-Southern, National Water Supply and Drainage Board, Matara.*

Internal Supervisor: *Dr. K.M. Mewan, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

MANAGEMENT OF BLACKISH FOLIAR DISCOLORATION IN *Scindapsus pictus* USING CALCIUM NITRATE AND MAGNESIUM SULPHATE

W.M.S.S. WIMALAWEERA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

At Omega Green (Pvt) Ltd, a Global G.A.P.-certified ornamental plant exporter in Sri Lanka, routine monitoring of the major export foliage crop *Scindapsus pictus* revealed blackish foliar discoloration that reduced visual quality and export value, prompting investigations into biotic and abiotic causes. Growing media analysis by Eurofins Agro (Netherlands), using a 1:1.5 v/v aqueous extraction, revealed low electrical conductivity (0.6 mS/cm), a pH of 6.8, and very low soluble calcium and magnesium (both <0.1 mmol/L), while leaf tissue analysis by inductively coupled plasma spectroscopy further indicated nutrient imbalances. A field trial was established according to a Randomized Complete Block Design (RCBD with three blocks and 42 replicates per treatment: control (T1); calcium nitrate (YaraTera CALCINIT) sprayed weekly at 3 g/L concentration (T2); and weekly calcium nitrate sprays combined with granular kieserite (magnesium sulphate) applied at 3 g/pot every three months (T3). Healthy and affected pots were recorded weekly over two months. At the final observation, treatments differed significantly ($p < 0.05$); T3 recorded the lowest incidence of affected pots (4.8%), compared with 11.1% for T2 and 34.9% for the control, an 86% reduction relative to the control. These findings indicate that combining calcium and magnesium nutrition, as in T3, may reduce the incidence of blackish foliar discoloration in *Scindapsus pictus* under commercial production conditions.

External Supervisor: Ms. K.A.S. Karunanayake, Production and HR Manager, Omega Green (Pvt) Ltd, Mulleyaya Estate, Godigamuwa, Badalgama.

Internal Supervisor: Dr. J.V.S. Aluthmuhandiram, Lecturer (Unconfirmed), Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

OPTIMIZATION OF CARBOHYDRATE-RICH FRACTION ISOLATION FROM KITHUL TREACLE (*Caryota urens*) FOR STABLE CARBON ISOTOPE ($\delta^{13}\text{C}$) ANALYSIS

B.S.N. MENDIS

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Kithul treacle (*Caryota urens*) is a high-value traditional Sri Lankan palm sweetener frequently targeted for adulteration with commercial sugar. Fourier Transform Infrared (FTIR) spectroscopy offers rapid screening, but its low sensitivity hinders detecting low-concentration adulterants. Elemental Analyzer–Isotope Ratio Mass Spectrometry (EA-IRMS) offers a complementary approach using $\delta^{13}\text{C}$ differences; however, direct analysis of raw treacle gives a bulk $\delta^{13}\text{C}$ value integrating carbon from carbohydrates and non-sugar matrix components (e.g., proteins, organic acids), obscuring the carbohydrate signature. High moisture content also compromises sample handling and combustion reproducibility limitations identified at the Sri Lanka Atomic Energy Board (SLAEB), prompting optimization of a carbohydrate extraction and purification protocol. Authentic *Kithul* treacle and an adulteration series were diluted with deionized water and centrifuged (2,500 rpm, 10 min) to remove insoluble particulates. Supernatant pH was adjusted to 10.5 with dropwise $\text{Ca}(\text{OH})_2$ slurry under stirring, clarified at 90 °C for 3 min to coagulate non-sugar impurities, and centrifuged (2,500 rpm, 10 min). The supernatant was titrated dropwise with 1.0 M H_2SO_4 to reach pH 5.0, avoiding alkaline degradation and acid inversion while precipitating calcium as calcium sulfate (CaSO_4). After centrifugation to remove salt, the supernatant was lyophilized to yield a carbohydrate-rich powder. The workflow isolates a carbohydrate-rich fraction prior to $\delta^{13}\text{C}$ EA-IRMS analysis, supporting *Kithul* treacle authenticity and adulteration studies.

External Supervisor: Mr. K.M. Binduhewa, Scientific Officer, Sri Lanka Atomic Energy Board, 60/460, Baseline Rd, Orugodawatta, Wellampitiya.

Internal Supervisor: Dr. D.R. Gimhani, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

DEVELOPING A COMPLIANT HAZARDOUS LABORATORY WASTE MANAGEMENT PROTOCOL FOR THE NATIONAL AQUATIC RESOURCES RESEARCH AND DEVELOPMENT AGENCY

K.D.H. SILVA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The Postharvest Technology Division of the National Aquatic Resources Research and Development Agency (NARA) conducts seafood safety and product development research generating laboratory wastes including heavy metals (cadmium, arsenic, lead), broken glassware, contaminated agarose gels, and microbiological media. Despite autoclaving microbiological waste, the lack of a standardized protocol and disposal infrastructure causes heavy metal effluents to accumulate on-site, inadequate containment of agarose gels, and municipal disposal of broken glassware, posing occupational and environmental hazards. To address these deficiencies, a laboratory waste management protocol was developed under the National Environmental (Protection and Quality) Regulations, No. 1 of 2008. The proposed framework includes obtaining a Scheduled Waste Management Licence (SWML), colour-coded waste segregation, personnel training, and systematic documentation. It recommends transferring contaminated agarose gels and pipette tips to Central Environmental Authority (CEA)-licensed hazardous waste facilities for authorized treatment, including high-temperature incineration. Heavy metal waste requires stabilization before authorized disposal, decontaminated broken glassware should be recycled or properly disposed of, and neutralized acids managed per regulatory standards. Implementing this protocol will improve laboratory safety, strengthen regulatory compliance, and minimize environmental risks at NARA.

External Supervisor: *Ms. P. Ginigaddarage, Senior Scientist, Postharvest Technology Division, National Aquatic Resources Research and Development Agency, Colombo 15.*

Internal Supervisor: *Dr. D.R. Gimhani, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

COMPARATIVE EVALUATION OF KJELDAHL AND CHNS/O ELEMENTAL ANALYSIS: ANALYTICAL PERFORMANCE, USABILITY, AND OPERATIONAL GUIDANCE

B.U.C.P.N. ABEYWARDHANA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The Microbial Biotechnology Research Programme (MBRP) at the National Institute of Fundamental Studies (NIFS) supports research across food, medicine, agriculture, environmental and plant sciences, and space biology, where nitrogen determination is essential for evaluating nutrient dynamics and microbial processes. Since MBRP operates both an automatic Kjeldahl analyzer and a CHNS/O elemental analyzer with distinct mechanisms and limitations, this study compared their analytical principles, sample preparation, operation, quality control, safety, maintenance, troubleshooting, data acquisition, and error sources to guide appropriate instrument selection. The CHNS/O analyzer uses complete sample combustion and detection, reducing operator and processing errors and improving analytical consistency, despite higher sample preparation and maintenance costs. Conversely, the widely established Kjeldahl method facilitates comparison with published databases, but extensive sample preparation, digestion, and manual handling increase operator and instrumental errors. To enhance procedural efficiency, user-friendly standard operating procedures (SOPs) and one-page schematic diagrams were developed, improving time management and accuracy, reducing costs, and enabling effective operation by personnel with limited technical expertise.

External Supervisor: *Dr. M. Premarathna, Research Fellow, Microbial Biotechnology Research Programme, National Institute of Fundamental Studies, Hantana Road, Kandy.*

Internal Supervisor: *Dr. D.R. Gimhani, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

DEVELOPMENT AND PROPOSED VALIDATION OF A MOBILE RGB SENSOR APPLICATION FOR ACCESSION-SPECIFIC TOMATO (*Solanum lycopersicum* L.) FRUIT MATURITY DETECTION

R.K.S. BINODA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Accurate determination of tomato (*Solanum lycopersicum* L.) fruit maturity is critical for optimizing harvest timing, reducing postharvest losses, and maintaining uniform quality. At the Plant Genetic Resources Centre (PGRC), Gannoruwa, tomato germplasm is conserved and designated by accession numbers and characterized via standard postharvest laboratory tests. In field settings, visual maturity staging using standard colour charts is prone to human subjectivity, grader fatigue, and colour variations across different genetic accessions. Thus, mobile optical sensors offer a more objective, efficient solution. This case study details the development and implementation of a lightweight, web-native HTML/JavaScript mobile application that utilizes standard smartphone RGB camera sensors for accession-specific colour detection. By processing fruit images on an HTML5 canvas, calculating average RGB values, and matching them against accession-specific baseline criteria (e.g., crimson, tangerine, red, orange), the application provides instant maturity verification across 10 distinct PGRC accessions. To further optimize accuracy, modern technological enhancements are proposed, including converting RGB data to HSV/LAB colour spaces, background segmentation, lightweight deep learning integration, and portable near-infrared (NIR) spectroscopic cross-validation. Finally, a structured pilot methodology is outlined to validate the tool against manual visual observation and laboratory reference tests.

External Supervisor: Dr. (Ms.) D.G.C. Jeewani, Additional Director, Plant Genetic Resources Centre, P.O. Box 59, Gannoruwa, Peradeniya.

Internal Supervisor: Dr. D.R. Gimhani, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

EVALUATING THE IMPACT OF SEMOLINA PARTICLE SIZE VARIATION ON THE LENGTH UNIFORMITY OF EXTRUDED PASTA

H.L.D. PERERA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

This study at P.M. Mohommed Ali & Company (Pvt) Ltd investigated the effect of semolina particle size distribution on extruded pasta length uniformity across three commercial brands (G1, M1, GB1) and five shapes (Elbow, Penne, Fusilli, Shell, Lumachine) under consistent processing conditions. Particle size distribution was analysed using 50-mesh (300 µm) and 80-mesh (180 µm) sieves, while pasta lengths were measured hourly over 15 days against company standards. Brands G1 and M1 consistently met length specifications, showing only occasional variations when fine particle proportions increased. Conversely, GB1 exhibited considerable dimensional variation: Shell reached 29 mm (specification: 22–27 mm), Elbow measured 16 mm (19–24 mm), and Penne reached 46 mm (37–42 mm). Sieve analysis revealed that over 91.8% of GB1 passed through the 50-mesh sieve, whereas G1 and M1 showed balanced distributions with 39.8–52.1% retained. The higher fine particle content provided a greater specific surface area, increased water absorption and altered dough hydration, consistency and moisture distribution. It potentially affects extrusion flow, pressure stability, die performance and drying shrinkage. These changes may have contributed to dimensional variations in the final products. The findings highlight the importance of semolina granulation in maintaining pasta length uniformity. Establishing stricter particle size specifications, implementing pre-extrusion sieve screening and conducting routine granulation assessments are recommended to improve product consistency and minimize product dimensional variations.

External Supervisor: *Mr. S. Jamsith, Quality Assurance Executive, P.M. Mohommed Ali & Company (Pvt) Ltd, Ballapana, Minuwangoda.*

Internal Supervisor: *Dr. D.R. Gimhani, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

ASSESSMENT OF MARIGOLD VARIETIES FOR SUITABILITY IN MUTATION BREEDING

N.S. SAMARAWEERA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The Sri Lanka Atomic Energy Board (SLAEB) plans to initiate a floriculture mutation-breeding programme using gamma irradiation to induce genetic variation and desirable ornamental traits; as an initial step, this study aimed to identify a suitable model crop variety and establish an irradiation protocol. African marigold (*Tagetes erecta* L.) has great potential for this initial step due to its short growth cycle, ease of cultivation, abundant seed production, floral characteristics, economic value, and suitability for local cultivation. The main objective was to identify a suitable African marigold accession from the 25 Sri Lankan accessions and to develop a gamma radiation induced mutation-breeding protocol. Accession no. 3 was selected and will be irradiated using a ^{60}Co source at Horticultural Crop Research and Development Institute (HORDI), Gannoruwa, Peradeniya to improve flower and branching traits. Genetically uniform seeds will be exposed to gamma-radiation doses of 25, 50, 75, 100, 125, and 150 Gy, with untreated seeds as the control. LD₅₀ and GR₅₀ values will be used to identify the preliminary irradiation range, while M₂ mutation frequency, and M₃ trait stability will determine the final dose. Subsequent generations will be screened for putative mutants exhibiting desirable flower characteristics and branching morphology and selected variants will be assessed for trait stability. This study provides a foundation for developing a gamma irradiation-induced mutation-breeding programme for crop improvement.

External Supervisor: Ms. B.A.T. Amalka, Scientific Officer, Sri Lanka Atomic Energy Board, No. 60/460, Baseline Road, Orugodawatte, Wellampitiya.

Internal Supervisor: Dr. J.V.S. Aluthmuhandiram, Lecturer (Unconfirmed), Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

MULTI-MODAL SENSING MOBILE APP FOR ACCESSION-SPECIFIC WATERMELON (*Citrullus lanatus*) PHYSIOLOGICAL MATURITY AND FLESH COLOUR DETECTION

M.G.D. SAMADHI

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Determining watermelon (*Citrullus lanatus*) maturity and internal flesh colour at harvest optimizes sugar content (°Brix) and reduces postharvest losses; however, diverse accessions exhibit varying rind thicknesses, striping, ground spots, and flesh colours (red, pink, yellow, orange, white), making visual inspection unreliable. Conventional thumb-tapping and tendril checks are subjective, while non-destructively assessing internal pigments (lycopene, beta-carotene, xanthophylls) remains challenging. This study developed a web-native HTML/JavaScript mobile app integrating smartphone camera, LED flash, and microphone sensors with a pre-loaded accession database for variety-specific thresholds. For internal colour detection, LED transillumination and camera back-scatter measurements compute RGB ratios, hue angles, and HSV parameters correlated with pigment accumulation. Simultaneously, acoustic resonance analysis captures a standardized manual tap via microphone, applying Fast Fourier Transform (FFT) processing to extract dominant resonant frequencies for tissue density evaluation. By fusing transillumination, acoustic frequency, and ground spot colour data against stored accession metrics, the app computes an instant maturity percentage and predicts flesh colour across varieties. Field validation demonstrated strong correlations with laboratory refractometry (°Brix), penetrometer firmness, and destructive RGB colorimetry, providing a cost-effective, non-destructive decision tool for harvest management.

External Supervisor: Dr. (Ms.) D.G.C. Jeewani, Additional Director, Plant Genetic Resources Centre, P.O. Box 59, Gannoruwa, Peradeniya.

Internal Supervisor: Dr. P.S. Warakagoda, Head and Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

DEVELOPMENT OF A BIOTECHNOLOGY PRODUCT PORTFOLIO AND TECHNICAL MARKETING FRAMEWORK FOR BIRD NOVA SCIENTIFIC (PVT) LTD

C.B. SEWWANDI

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Bird Nova Scientific (Pvt) Ltd imports and distributes laboratory instruments, chemicals, glassware, and consumables across Sri Lanka; however, its biotechnology products (molecular biology, cell biology, and plant biotechnology) lack a separate application-based portfolio, complicating product selection, technical support, and quotation preparation. Therefore, this case study proposed a Biotechnology Product Portfolio and Technical Marketing Framework for Bird Nova Scientific (Pvt) Ltd. The proposed work includes reviewing the existing product range, categorizing biotechnology laboratory requirements, and assembling product information from suppliers in India, China and Germany based on quality, availability and delivery time. Custom DNA primers were also considered. The HiMedia Laboratories product range was reviewed and organized according to applications such as DNA and RNA extraction, PCR, electrophoresis, cell culture and plant tissue culture. Products were arranged with applications, product codes, pack sizes and technical information to support quotations and inquiries. Application-based groups were proposed to connect products with laboratory workflows. This framework is expected to improve product selection, technical communication, quotation preparation and customer support while creating opportunities for regular biotechnology consumable sales. Further evaluation through customer feedback and pilot quotations is recommended.

External Supervisor: *Mr. S. Senarath, Managing Director, Bird Nova Scientific (Pvt) Ltd, No. 526/D/1, Malabe-Kottawa Road, Hokandara North, Hokandara.*

Internal Supervisor: *Dr. P.S. Warakagoda, Head and Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

DEVELOPMENT AND VALIDATION OF AN ALTERNATIVE CLEANING CHEMICAL THROUGH MICROBIOLOGICAL AND QUALITY ASSESSMENT

H.M.M.D. HERATH

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Nestlé Lanka Limited, guided by its purpose of “Good Food, Good Life,” maintains rigorous food safety, quality, and hygiene standards, where effective cleaning is essential to prevent contamination. This study evaluated an alternative cleaning chemical against the current chemical in selected production areas. Validation trials were conducted at the Ultra Heat Treatment (UHT) and Powder Beverage process floors, Milk Powder Filling Sifter Sieve Lid, and Powder Collecting Hopper, alongside floor surfaces in the Spray Drying (Milk and Coconut Milk Powder) and Evaporated Milk (EVM) areas. Surface swab samples were collected before and after cleaning using both chemicals. Cleaning effectiveness was assessed using Total Plate Count (TPC), Enterobacteriaceae (EB), and visual inspection. Tissue-paper weight assessment was included to evaluate residual moisture and surface drying, while heavy-metal testing was conducted to assess potential chemical residues. The results indicated reductions in microbial counts following cleaning with both chemicals, with comparable cleaning performance observed between the alternative and currently used cleaning chemicals at the evaluated locations. Heavy-metal testing and evaluation of the remaining locations are ongoing. Overall, the findings suggest that the alternative cleaning chemical has a potential for use in selected food manufacturing applications, subject to completion of the ongoing validation activities.

External Supervisor: *Mr. P. Chamikara, Food Safety Manager, Quality Assurance Department, Nestlé Lanka Ltd, Kurunegala Factory.*

Internal Supervisor: *Dr. P.S. Warakagoda, Head and Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

DEVELOPMENT OF A LOW-COST CHEMICAL INVENTORY AND EQUIPMENT CALIBRATION TRACKING SYSTEM FOR LABORATORY MANAGEMENT

M.A.H.I.M. PERERA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Accurate chemical inventory records and up-to-date equipment calibration are fundamental to laboratory reliability, safety, and regulatory compliance at the Biotechnology Unit of the Industrial Technology Institute (ITI), which delivers molecular diagnostics, food and cosmetic authentication, and applied research using advanced techniques such as qPCR and ELISA. This case study presents the design of a low-cost, prototype tracking system tailored to manage chemical inventory and equipment calibration status at the Biotechnology Unit. The system provides a centralized, searchable platform for recording reagent and equipment status, replacing informal, label-based checking, and has the following functionalities: (i) a role-based access structure distinguishing Authorized Staff, Temporary Staff, and Temporary Students/Interns, with access rights matched to assignment duration; (ii) an individual, role-aware QR-code login concept in place of a shared generic login; (iii) automatic calculation of calibration due status (OK, Due Soon, Overdue) from the last calibration date and interval, supplemented by colour-coded physical indicators; and (iv) a tiered, optional reminder mechanism restricted to authorized personnel. Key design considerations, include regulatory and quality-assurance compliance and the practical constraints of a short training placement. A working interactive prototype demonstrates the login flow, role-based dashboard, and calibration tracking in action, offering a practical basis for future adoption within the unit.

External Supervisor: *Ms. W.T.G.S.L. Withana, Research Scientist, Biotechnology Unit, Industrial Technology Institute (ITI), Colombo 07.*

Internal Supervisor: *Dr. P.S. Warakagoda, Head and Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

ASSESSMENT AND PROPOSED DESIGN OF AN IN-HOUSE QUALITY CONTROL LABORATORY FRAMEWORK FOR WEWELWALA MILLS (PVT) LTD

S.S.W. DENIPITIYA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Wewelwala Mills (Pvt) Ltd, established in 1974, produces virgin, premium, and copra coconut oils; however, outsourcing quantitative laboratory analyses (~25 samples monthly with 10–20-day turnaround times) delays quality assessment and process monitoring. This study proposes a 550 ft² in-house quality control laboratory partitioned into chemical and microbiological sections with dedicated zones for sample preparation, analysis, storage, washing, and record management equipped with titration setups, a moisture meter, colorimeter, refractometer, autoclave, and incubator to ensure workflow efficiency, safety, and cross-contamination prevention. The design aligns with critical quality parameters, processing-stage sampling points, and regulatory standards (SLS 313 for coconut oil; ISO 4833-1 and ISO 21527 for microbial enumeration). Routine chemical testing will cover free fatty acids (FFA), moisture, iodine and peroxide values, colour, and refractive index, alongside phased microbiological testing for total plate count (TPC) and yeast and & mould enumeration, while specialized tests (e.g., aflatoxins, advanced pathogens) remain with accredited external laboratories. Establishing this facility will accelerate analytical turnaround, improve process monitoring, traceability, and corrective actions, and build historical data to strengthen quality assurance at Wewelwala Mills (Pvt) Ltd.

External Supervisor: *Ms. U. Diddeniya, Managing Director, Wewelwala Mills (Pvt) Ltd, No. 77/1A, Sri Hemananda Mawatha, Bataganwila, Galle.*

Internal Supervisor: *Dr. P.S. Warakagoda, Head and Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

MINIMIZATION OF WATER WASTAGE IN MANUAL BOTTLING OPERATIONS: AN AUTOMATED ALTERNATING FLOW-CONTROL RETROFIT

H.P.S. NAMINA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

American Premium Water Systems (Pvt.) Ltd. operates a commercial bottled water facility with predominantly automated production lines. The 5-L bottle line (Line 3) uses manual filling and during the process, it currently wastes approximately 24% of the water discharged from the filling outlets under observed operating conditions (8.3 s fill time; 11 bottles/min combined from both outlets), with wastage further rising at faster flow rates. Two continuously open manual outlets cause discharge and overflow during bottle replacement. This case study proposes a targeted electronic flow-control retrofit to reduce water loss during filling and bottle replacement. The proposed system uses two independently actuated valves, a 1-inlet/2-outlet manifold, and a programmable 24-volt direct current (VDC) controller. Each valve is designed to open for an adjustable fill period, set to match the actual flow rate so the bottle fills without underfill or overflow, then closes during bottle swap. Valves open quickly but close slowly (1.5–2 s), producing a controlled overlap during transfer that prevents deadhead pressure spikes and water hammer. While one bottle is filling, the operator replaces the opposite bottle. The intervention is expected to reduce swap-related discharge and overfilling, maintain approximately 11 bottles/min throughput under normal operating conditions, and improve process-water efficiency. The study demonstrates a low-cost automation approach for reducing water wastage in manual filling operations.

External Supervisor: *Mr. W. Disanayake, General Manager, American Premium Water Systems (Pvt) Ltd, Artigala, Hanwellla.*

Internal Supervisor: *Dr. J.V.S. Aluthmuhandiram, Lecturer (Unconfirmed), Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

VALIDATION OF GERMINATION AND VIGOUR CRITERIA FOR DETERMINING THE STORAGE PERIOD OF CERTIFIED SEED PADDY VARIETIES IN SRI LANKA

P.G.A. NAJEEB

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

At the Central Seed Testing Laboratory (CSTL), Gannoruwa, under the Seed Certification Service (SCS), seed lots undergo pre-certification B-tests (physical purity, lot control, moisture, and germination), whereas lots showing poor field emergence after three months of storage undergo re-evaluation via C-tests (lot control and germination). This study examined 20 certified seed paddy samples stored at the Nikaweratiya Seed and Planting Material Development Centre (SPMDC) facility that passed B-test germination but exhibited reduced field emergence. Electrical conductivity (EC), radicle emergence (RE%), tetrazolium (TTC) viability, seedling vigour index (SVI), growth index (GI), 1,000-seed weight, and seedling biomass were evaluated alongside storage suitability against Harrington's and James' Rules. All samples showed marked post-storage germination declines; RE% closely tracked germination outcomes, whereas EC correlated poorly with viability due to paddy's small living embryo and large dead endosperm. Extended storage markedly reduced germination via storage-driven deterioration, as facility temperatures (~45 °C without ventilation) exceeded James' Rule thresholds regardless of humidity. These findings validate RE%, SVI, GI and normal germination as reliable vigour indicators for certified paddy seed, and confirm that inadequate storage conditions cause post-certification germination failure, underscoring the need for standards-compliant storage infrastructure.

External Supervisor: *Mr. J.W.K. Samaranayake, Assistant Director of Agriculture, Seed Certification Service, Central Seed Testing Laboratory, Gannoruwa.*

Internal Supervisor: *Dr. M.J.M.S. Kurera, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

FEASIBILITY OF UV-C STERILISATION LIGHTING AS A DIVERSIFICATION PATHWAY FOR A LIGHTING AND DESIGNING COMPANY IN SRI LANKA

M.H.F. FASRA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

WHF Lighting (Pvt) Ltd provides residential and commercial lighting design and installation in Sri Lanka, but currently lacks dedicated capabilities for laboratory or biosafety lighting despite rising demand for scientific and healthcare infrastructure. Germicidal ultraviolet-C (UV-C) radiation (~ 200–280 nm) is widely used to disinfect surfaces, air, and water in hospitals and laboratories, yet no local lighting company currently integrates UV-C or laboratory-specific lighting into its services. This case study assessed the feasibility of WHF diversifying into this space through a structured review of literature and industry sources, covering current UV-C sterilisation use in Sri Lanka, local component sourcing, Sri Lankan biosafety guidelines issued by the Ministry of Health and the Sri Lanka College of Microbiologists, and comparable laboratory design frameworks from the United Kingdom and the United States. The review found that UV-C equipment is already imported and used across Sri Lankan hospitals and laboratories, and at least one Sri Lankan company has already transitioned successfully from equipment supply to turnkey laboratory design, confirming a viable local precedent. Accordingly, a lighting design workflow linking WHF's existing tools to laboratory requirements was developed and demonstrated via a mock laboratory design, confirming that UV-C sterilisation lighting offers a feasible, underserved diversification pathway for WHF.

External Supervisor: Mr. M. Feros, Senior Project Manager, WHF Lighting and Building Materials (Pvt) Ltd, Dehiwala.

Internal Supervisor: Dr. M.J.M.S. Kurera, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

STRUCTURAL BARRIERS TO GOOD AGRICULTURAL PRACTICES (GAP) ADOPTION AMONG FRUIT AND VEGETABLE PRODUCERS IN SRI LANKA

K.S.A. PREMAWEERA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Although Sri Lanka Good Agricultural Practices (SL-GAP) certification promotes safer, low-chemical, and hygienic fruit and vegetable cultivation, adoption among smallholders remains low; therefore, this study at the Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI) investigated barriers to SL-GAP adoption. Across five districts (Nuwara Eliya, Badulla, Matale, Kurunegala, and Hambantota), 24 farmer group discussions and 36 interviews with extension officers, auditors, wholesalers, and supermarket buyers were conducted. Findings revealed a “cost–benefit paradox”: compliant farmers incur added costs and labour for storage, record-keeping, and safety gear but receive no price premium because certified and uncertified produce are mixed in wholesale markets without differentiation. Limited institutional capacity (>1,500 farmers per extension officer and 6–14-month certification delays) and low consumer awareness of the SL-GAP label further discourage adoption. The study recommends faster testing, mobile record-keeping applications, group certification, separate certified sections in markets, and supermarket contracts with guaranteed prices. From a biotechnology perspective, strengthening laboratory capacity for the rapid detection of pesticide residues and harmful microbes, together with digital traceability tools such as QR codes linked to authentic certification records, could further improve transparency and consumer confidence.

External Supervisor: *Mr. W.H.D. Priyadarshana, Research Fellow and Head, Food System Division, Hector Kobbekaduwa Agrarian Research and Training Institute, Colombo 07.*

Internal Supervisor: *Dr. M.J.M.S. Kurera, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

REGIONAL VARIATION IN THE NUTRITIONAL COMPOSITION AND METABOLIZABLE ENERGY OF RICE POLISH USED IN ANIMAL FEED FORMULATION

M.T.F. THAHEERA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Rice polish, a milling by-product with a favourable nutrient profile, is widely used as an economical energy and protein source in poultry and livestock feeds. This study examined regional variation in the nutritional composition and estimated metabolizable energy (ME) of 107 rice polish samples from Sri Lanka's Eastern Province (n=54) and Southern Province (n=53) using two months of laboratory quality-control data from a commercial feed mill. Moisture, ash, crude protein, ether extract, and crude fibre were determined via standard laboratory methods, nitrogen-free extract and ME were calculated mathematically, and regional differences were analysed using Welch's t-test. Moisture and crude fibre did not differ significantly between regions region ($p > 0.05$), whereas Eastern Province samples had significantly higher crude protein (13.48% vs. 12.07%, $p < 0.001$), ether extract (15.25% vs. 13.68%, $p < 0.001$), and ash (9.75% vs. 8.87%, $p < 0.001$). Metabolizable energy was also significantly higher in Eastern province samples (2,732 vs 2,641 kcal/kg, $p < 0.001$), attributable primarily to their greater ether extract content. These differences may be linked to the Eastern Province's location within Sri Lanka's dry zone, where variation in cultivation and milling practices could affect bran and germ retention in the resulting polish. Feed manufacturers must therefore follow routine quality-control testing to accurately determine the nutritional composition of rice polish to support accurate feed formulation and consistent feed quality.

External Supervisor: *Mr. T. Jeyharan, Deputy General Manager (Nutrition), Kosmo Feed Mills (Pvt) Ltd, Hunugama, Bandarakoswatta*

Internal Supervisor: *Dr. M.J.M.S. Kurera, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

ASSESSMENT OF COCONUT MILK pH VARIATION AMONG DIFFERENT SOURCING AREAS AND PROPOSED QUALITY CONTROL MEASURES

G.R.D.P. MENIKE

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Coconut milk is a major local and export product at Ceylon Biscuits Limited (CBL) Global Foods Limited; however, raw material variations across sourcing areas can affect coconut milk pH and final product quality, prompting this study to evaluate regional pH differences. Five coconuts were collected from each selected sourcing area, the kernels were cut into small pieces and used to extract coconut milk under standardized conditions. The pH of each sample was measured by using a calibrated pH meter, and compared with the company acceptance criterion of pH of up to 5.92. The results revealed variation in pH among samples from different sourcing areas, with several samples exceeding the specified acceptance limit. The observed variation may be associated with differences in raw material characteristics and pre-processing conditions. Therefore, systematic pH monitoring of incoming coconut raw materials is recommended. Standardized sampling procedures, proper pH-meter calibration, timely processing, temperature control during transportation and storage, and sourcing-area-wise monitoring could help improve consistency. Further studies including larger sample sizes, and statistical analysis are recommended to determine whether the observed variation is significantly associated with sourcing area. This case study highlights the importance of pH monitoring as a practical quality-control parameter in coconut milk production.

External Supervisor: *Mrs. P. Anwarama, Assistant Manager-Laboratory, CBL Global Foods Ltd, No. 145, Colombo Road, Alawwa.*

Internal Supervisor: *Dr. D.S. Liyanage, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

EVALUATION OF *Trichoderma harzianum* AND *Phanerochaete chrysosporium* FOR EFFICIENT COMPOSTING OF COIR DUST, PADDY HUSK AND CHICKEN MANURE MIXTURE

M.M.M. LEENA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Because coir dust, paddy husk, and chicken manure decompose slowly under conventional composting, this study at Sri Biotech Lanka (Pvt) Ltd evaluated a combined *Trichoderma harzianum* and *Phanerochaete chrysosporium* (TH+PC) inoculant as an in vitro microbial decomposer using liquid and powder formulations across three dose levels. Seven treatments (T1–T3: liquid; T4–T6: powder; T7: control) were arranged in a completely randomized design (CRD) with three replicates and monitored over 35 days for temperature, pH, dry weight loss, CO₂-C evolution, and seed germination index (SGI). Temperature rose from ~27 °C initially to a peak of 30 °C around day 29 before declining slightly by day 34, accompanied by reduced odour and gradual darkening to black, indicating active decomposition and stabilization. Observations up to day 21 showed that T3 recorded the highest CO₂-C evolution (36.25 mg CO₂-C g⁻¹ dry compost day⁻¹), compared with 30.33 mg CO₂-C g⁻¹ dry compost day⁻¹ in the control. T3 also exhibited a comparatively high SGI of 81.53%, suggesting greater decomposition activity at that stage. The pH of all treatments remained within the neutral range of 6.7–7.6. Further assessment is required to determine which formulation and dose produces the most mature, high-quality compost. These preliminary findings suggest that the high-dose liquid formulation may be promising, although a conclusive determination awaits completion of the maturity assessment.

External Supervisor: Mr. Y.G.S.S. Gunathunga, Senior Microbiologist, Sri Biotech Lanka (Pvt) Ltd, G&G Group, Mawathagama, Meepe.

Internal Supervisor: Dr. M.J.M.S. Kurera, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.

DESIGN OF A POPULATION-LEVEL SMART FIELD ISO-CAGE TO PREVENT CROSS-POLLINATION AMONG Solanaceae ACCESSIONS AT THE PLANT GENETIC RESOURCES CENTRE

T.P.H.P. INDRASIRI

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The Plant Genetic Resources Centre (PGRC) in Gannoruwa is the national institute under the Department of Agriculture dedicated to the conservation, evaluation, and utilization of plant genetic resources in Sri Lanka. Maintaining genetic purity during field regeneration of crops at PGRC is essential to increase pure seed quantity for long-term germplasm conservation. However, field regeneration of Solanaceae accessions (Tomatoes) face critical operational challenges. Existing isolation method of insect-proof netting, suffer from severe drawbacks including physical floral damage, severe micro-climatic heat traps, humidity-induced flower abortion, and lack of self-pollination mechanisms. To overcome these limitations, a population-level “Smart Field Iso-Cage” (5 m × 2 m × 3 m; 10–15 mature plants) was designed, featuring a fibreglass hoop exoskeleton and internal silicone cord network enclosed by a 0.2 mm polytetrafluoroethylene (PTFE)-treated high-density polyethylene (HDPE) micro-mesh that excludes larger pollinators (bees, flies, moths) and repels smaller pests (thrips, aphids). A micro-perforated aluminized Mylar roof regulates heat and humidity, while a phase-change material (PCM)-lined neoprene soil collar blocks ground-level insect entry and buffers temperature fluctuations. Furthermore, wind-driven aero-elastic flutter ribbons transmit kinetic vibrations for automated buzz-pollination, providing an effective alternative to conventional netting for preventing cross-pollination among Solanaceae accessions.

External Supervisor: *Dr. (Ms.) D.G.C. Jeewani, Additional Director, Plant Genetic Resources Centre, Department of Agriculture, Gannoruwa, Peradeniya.*

Internal Supervisor: *Dr. J.V.S. Aluthmuhandiram, Lecturer (Unconfirmed), Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

DEVELOPMENT OF A SUPPLEMENTARY GUIDE FOR INSTRUMENT OPERATION AND DATA PROCESSING USING SHIMADZU LABSOLUTIONS SOFTWARE FOR FTIR, AAS AND HPLC

H.M.G.P. HERATH

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Kelun Lifesciences (Pvt) Ltd, is a leading pharmaceutical manufacturing facility specializing in sterile liquid infusions and injectables. Within the organization, the Quality Control (QC) laboratory relies on advanced analytical instruments, including the Fourier Transform Infrared Spectrometer (FTIR), Atomic Absorption Spectrophotometer (AAS) and High-Performance Liquid Chromatography (HPLC), which are operated using the Shimadzu LabSolutions software for data processing and analysis. While Standard Operating Procedures (SOPs) exist for instrument operation and calibration, these documents are technically dense and lack practical steps for software-based data processing. As the organization continuously recruits trainee chemists, new employees require considerable time to master these instruments and often lack the confidence to perform analysis independently, and confidently. Hence, this study was conducted to develop a supplementary training guide explaining the operating procedures, data processing, and analysis steps for FTIR, AAS and HPLC. The guide utilizes annotated screenshots of the LabSolutions interface and instrument photographs to simplify the process for newcomers. Designed to extend existing SOPs, rather than replace them, the guide was structured for future review and approval by the Quality Assurance Department. The proposed guide is expected to reduce training time, improve trainee confidence, support consistence, and efficient instrument operation within the QC laboratory.

External Supervisor: *Ms. N. Ekanayaka, Executive Chemist, Department of Quality Control, Kelun Lifesciences (Pvt) Ltd, Pallekele, Kandy.*

Internal Supervisor: *Dr. D.S. Liyanage, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

ANALYSIS OF FACTORS CONTRIBUTING TO HIGH RETURNS OF SOYA PRODUCTS AND PROPOSED IMPROVEMENT STRATEGIES

W.D.S.U. DHARMASIRI

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Product returns are a major concern in the food manufacturing industry, contributing to product wastage, increased operational costs, and financial losses. This case study investigated the factors contributing to high market returns of soya products and identified suitable strategies to minimize returns and improve operational performance. The study analyzed existing market return records, product-wise return data, and internal product transfer records to identify return patterns and determine the major areas requiring improvement. Preliminary analysis revealed an overall market return rate of 3.20%, significantly exceeding the established standard of 1.25%. Potential contributing factors including packaging damage, pest infestation, improper storage, inadequate stock rotation, transportation issues, and shelf-life-related returns were investigated through return record analysis, personnel discussions, and direct observations of production, storage, and distribution practices. Based on the identified root causes, measures such as packaging seal inspections, regular pest monitoring, proper stock rotation, and hygienic handling to minimize contamination risks were proposed. The identified opportunities and proposed strategies provide a clear framework to reduce avoidable product returns, minimize operational losses, and improve production efficiency.

External Supervisor: *Mr. I.U.K. Rathnayake, General Manager (Production), Raigam Marketing Services (Pvt.) Ltd, No. 277, Koswatta, Kiriwaththuduwa.*

Internal Supervisor: *Dr. D.S. Liyanage, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

OPTIMIZATION OF ALUM DOSAGE FOR TURBIDITY REMOVAL FROM HIGH-TURBIDITY MA OYA RAW WATER

W.K.D.T. WATHTHAGE

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

The National Water Supply and Drainage Board (NWSDB) supplies safe drinking water compliant with SLS 614:2013 across Sri Lanka through regular monitoring of key parameters such as turbidity, which rises sharply in surface water during heavy rainfall. *Ma Oya* is used as a raw-water source for the selected water treatment process. During the dry season, the turbidity of *Ma Oya* raw water was approximately 15–20 NTU, while heavy rainfall increased it to approximately 100 NTU. The major issue identified was that the alum dosage applied during the coagulation and sedimentation process was insufficient to effectively remove the increased turbidity. Consequently, high residual turbidity remained after sedimentation, increasing the particle load entering filtration and affecting the achievement of the required drinking-water turbidity of less than 2 NTU. Therefore, a jar test was conducted to determine the optimum alum dosage for treating high-turbidity raw water. Raw water with an initial turbidity of 100 NTU was treated with alum dosages of 10, 20, 30, 40, 50 and 60 mg/L, followed by rapid, intermediate and slow mixing followed by 20 minutes of settling. The corresponding residual turbidity values were 9.85, 4.65, 3.30, 3.87, 4.86 and 6.10 NTU, respectively. The lowest residual turbidity of 3.30 NTU was obtained at an alum dosage of 30 mg/L, which was identified as the optimum dosage under the tested conditions. Subsequent laboratory filtration using Whatman filter paper reduced turbidity to 1.5 NTU. The findings demonstrate that alum dosage optimization through jar testing can be used to improve the treatment efficiency during rainfall-induced turbidity increase.

External Supervisor: *Mr. E.A.N.N. Wijayasinghe, Chemist, National Water Supply and Drainage Board (NWSDB), Regional Laboratory, Negombo.*

Internal Supervisor: *Dr. D.S. Liyanage, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

EVALUATION OF LONG-TERM CONTROL SAMPLE MANAGEMENT AND QUANTITY VARIATION IN RAW MATERIAL QUALITY CONTROL

B. N. D. BOGAHAPITIYA

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

Retained control samples in pharmaceutical quality control (QC) laboratories provide representative materials for future investigations, verification, and complaint assessments; therefore, this study in the Raw Material QC section of Kelun Lifesciences (Pvt) Ltd evaluated long-term control sample management, retention periods, and storage quantity variations. Samples collected between 2021 and 2026 were reviewed by comparing information on sample labels and control checklists with current physical quantities. The relationship between raw material expiry, finished product release, and assigned retention periods was also evaluated. Control samples were retained beyond the expiry dates of the raw materials, driven by assigned retention periods based on finished product release. Weight variations, both increases and decreases were observed between recorded and currently measured quantities. These observed variations were assessed against possible factors, including moisture absorption or loss, previous sample withdrawals, handling losses, material characteristics, container integrity, and storage conditions. The findings highlight the importance of monitoring sample stability and traceability during long-term retention. Recommendations are proposed to review retention practices and strengthen control sample monitoring, documentation, and storage traceability while maintaining compliance with approved pharmaceutical quality procedures.

External Supervisor: *Ms. N. Ekanayake, Executive Chemist, Department of Quality Control, Kelun Lifesciences (Pvt) Ltd, Pallekele, Kandy.*

Internal Supervisor: *Dr. D.S. Liyanage, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

DEVELOPMENT OF A DIGITAL RESEARCH ARCHIVE FOR EASY ACCESS TO ORGANIC FARMING AND AGRO-ECOLOGY INFORMATION AT SARDC, MAKANDURA

R.D.K. DILSHAN

*Department of Biotechnology, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Abstract

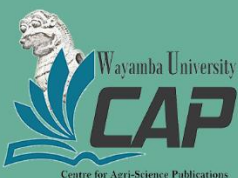
Although research on organic farming and agro-ecology is vital for agricultural development, retrieving scattered records is time-consuming; therefore, this study at the Sustainable Agricultural Research and Development Centre (SARDC), Makandura, developed the SARDC Digital Research Archive to organize and streamline access to organic farming, agro-ecology, and multi-disciplinary agricultural research materials. Built as a single-file offline application using HTML, CSS, JavaScript, and IndexedDB, the platform stores research records and attached PDF files locally without requiring internet connectivity or external servers. Key features include adding, editing, viewing, downloading, searching, filtering, and deleting records, alongside dashboard summaries, discipline- and crop-based libraries, standardized file-naming, backup/restore functions, and CSV catalogue export. At present, the archive supports SARDC officers in retrieving research information more efficiently. In the future, it is intended to be connected to the internet and made accessible to farmers, input producers, Department of Agriculture officers, researchers, and other interested users. The developed system provides a practical and low-cost approach to improving access to organic farming and agro-ecology information, supporting knowledge sharing, informed decision-making, and future expansion of the institutional research archive.

External Supervisor: *Dr. (Mrs.) J.M.D.D.E. Jayamanne, Additional Director, Sustainable Agricultural Research and Development Centre (SARDC), Makandura, Gonawila (NWP).*

Internal Supervisor: *Dr. J.V.S. Aluthmuhandiram, Lecturer (Unconfirmed), Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*



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