Biotechnology Industrial Training - 2023

Executive Summaries

BIT - 2023

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

Biotechnology Industrial Training - 2023

Executive Summaries

BIT - 2023

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

Biotechnology Industrial Training - 2023
Executive Summaries

Published by:

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

Telephone : 031 – 22 99 704
Fax : 031 – 22 99 248
Website : www.wyb.ac.lk

Printed by:

Wayamba University Centre for Agri-Science Publications (WUCAP),
Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka,
Makanduara, Gonawila (NWP), 60170

ISBN No: **978-624-5564-80-4**

ISSN No: 2783-8757

Biotechnology Industrial Training – 2023
Executive Summaries

Acknowledgements

Department of Biotechnology greatly appreciates the following Heads and staff of the organizations for their cooperation in providing in-plant-training opportunities to the students from June 2023 to August 2023.

- Senior Chemist, Regional Laboratory, National Water Supply and Drainage Board, Ampara
- Scientist/Quality Manager, Genetech, Sri Lanka
- Executive Quality Control, ACE Healthcare (Pvt.) Ltd, Horana
- Assistant Manager – Production Manufacturing, Nestle Lanka PLC, Sri Lanka
- Senior Chemist, Department of Research & Development, HEMAS Manufacturing (Pvt) Ltd, Dankotuwa
- Research and Development Executive, SunAgro LifeScience Limited, Colombo 10, Sri Lanka
- Manager, Quality Control Division and Junior Executive, Quality Control Division, Astron Limited, No. 688, Galle Road, Ratmalana, Sri Lanka
- Manager, Chemical Laboratory**,** SGS Lanka (Pvt) Ltd, Colombo 2, Sri Lanka
- Senior Professor in Molecular Biology, Institute of Biochemistry, Molecular Biology and Biotechnology (IBMBB)
- Chemist, Water Quality Laboratory, Central Environmental Authority, Baththaramulla, Sri Lanka.
- Senior Research Scientist, Herbal Technology Section, Modern Research and Development Complex, Industrial Technology Institute (ITI), Malabe
- Senior Manager, Department of Quality Assurance and Technical**,** Ceylon Grain Elevators PLC, Sri Lanka
- Assistant Production Manager, Nestle Lanka PLC, Makandura, Gonawila

- Head of the Department, Asiri Centre for Genomic Medicine and Regenerative Medicine, Asiri Surgical Hospital PLC, Colombo, Sri Lanka

- Scientist, Marine Biological Resources Division (MBRD) and Head/ Principal Scientist, Environmental Studies Division (ESD), National Aquatic Resources Research and Development Agency (NARA), Crow Island, Mattakkuliya, Colombo 15

- Assistant Director of Agriculture, In charge, Rice Research Station, Labuduwa.

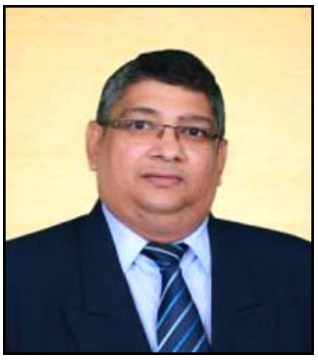
- Production Manager, Island Dairies (PVT) LTD, Kegalle

- Head/Senior Research Professor, and Postdoctoral Research Fellow/ Coordinator, Microbial Biotechnology Unit, National Institute of Fundamental Studies, Kandy

- Assistant Director of Agriculture (Research), Regional Rice Research and Development Centre, Bombuwala, Sri Lanka

- Deputy Director (Research), Molecular Virology Division, Plant Virus Indexing Centre, Gabadawaththa, Homagama, Sri Lanka

- Senior Executive- Production, and Plant Manager- Beverages, Nestle Lanka PLC, Kurunegala



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

I am pleased to write a message to the Executive Summaries Booklet of the "Biotechnology Industrial Training 2023" (BIT-2023) of the Department of Biotechnology, Faculty of Agriculture & Plantation Management. It is a great pleasure to see the achievements of the 24 final-year students whose case studies are published in this booklet. Being a member of the Faculty of Agriculture & Plantation Management, it is a huge satisfaction indeed.

As the students in the field of Biotechnology, you have countless opportunities to be engaged with multidisciplinary activities combining natural sciences with engineering sciences aiming more innovations to the society. The In-plant Training component of the curriculum is the platform where the students can align their heard-earned knowledge and skills with practical experiences to achieve the industrial targets. It is a huge achievement of the Department to disseminate the outcomes of such case studies of these students who have undergone In-Plant Training successfully.

I would like to offer my sincere appreciation to the staff, students and all other parties who were involved in organizing this event to convert their untiring efforts to a success story.

Senior Prof. Udith K Jayasinghe
Vice-Chancellor
Wayamba University of Sri Lanka

Message from the Dean of the Faculty of Agriculture and Plantation Management

It is a great pleasure for me to forward this message together with my greetings for publishing In-Plant Training experiences of final year students of the Department of Biotechnology, Faculty of Agriculture and Plantation Management named "Biotechnology Industrial Training- 2023 (BIT-2023)", Executive Summaries. I am delighted to see that this year as well, they have continued to publish the booklet "Biotechnology Industrial Training-2023, Executive summaries" which includes the case studies conducted during the industrial training of the students, providing them a better platform to disseminate their findings to a wider audience.

In-Plant Training of the final year students aims at giving the students an opportunity to transform their theoretical knowledge and practical skills gathered during the four-year intensive academic programme into analytical skills of problem-solving in the real world of work, making them competent to be effective graduates who can serve the country.

I wish to thank the Head and the staff members of the Department of Biotechnology, for their commitment to the successful completion of the In-plant Training of Biotechnology specializing students in various government and private organizations. I appreciate their untiring effort in supervising the industrial training of students, reviewing their abstracts, and preparing a publication on "Biotechnology Industrial Training 2023 (BIT - 2023)", Executive Summaries.

I congratulate the final year students of the Department of Biotechnology for their final presentations on Industrial Training and wish them all the success in their future endeavors.

Prof. J. C. Edirisinghe
Dean
Faculty of Agriculture and Plantation Management

Message from the Head of the Department of Biotechnology

It is a great pleasure for me to send this message on the occasion of publishing In-Plant Training experiences of final year students of the Department of Biotechnology as "Biotechnology Industrial Training 2023 (BIT - 2023)", Executive Summaries.

Every year, final-year students of the Department of Biotechnology are accommodated in different industries and organizations that are dealing with biotechnology to undertake their in-plant training with the aim of giving students an exposure to the real world of work while enabling students to correlate their theoretical understanding and practical skills. Also, it provides opportunities for students to strengthen their soft skills, logical thinking and problem-solving skills, which prepare their mindset to work after graduation with self-confidence.

It is happy to mention that during this year also we were able to accommodate our final year students at various government and private organizations to undertake their training programme. I wish to extend my sincere thanks to all the organizations and industrial supervisors for accepting our request and providing a successful training programme.

I would like to take this opportunity to express my gratitude to the Vice-Chancellor, Senior Prof. Udith K. Jayasinghe and Dean, Faculty of Agriculture and Plantation Management, Prof. J. C. Edirisinghe, for the unreserved support extended while providing all the needful to make 'BIT – 2023' and the publication of the booklet a success. I wish to extend my heartfelt appreciation to the In-Plant Training Coordinator-2023, Dr. K.M. Mewan and all the academic staff of the Department, for their untiring effort extended in supervising students and editorial work. All academic supportive staff, non-academic staff and students are also acknowledged for their support rendered in many ways.

I congratulate students and wish them success in their future endeavors.

Dr. D. R. Gimhani
Head/Department of Biotechnology

Message from the In-Plant Training Coordinator

I am delighted to introduce an insightful publication "Biotechnology Industrial Training 2023 (BIT - 2023) Executive Summaries", that captures the essence of the In-plant Training experiences of 24 final-year students attached to the Department of Biotechnology.

In-plant Training program bridges the gap between theoretical knowledge and real-world applications, equipping our students with the skills and confidence needed to excel in their chosen fields. As the In-Plant Training Coordinator, it brings me immense pleasure to present this book, a culmination of our final year students' remarkable journey into the world of practical learning which encapsulates their transformative experiences as they step beyond the confines of traditional classrooms and embrace the dynamic realm of hands-on learning.

Within these pages, you will discover inspiring outcomes of the case studies conducted by the students collaborating with industry leaders and renowned scientists. The book showcases their achievements, highlighting their growth, adaptability, and the meaningful contributions they have made during their industrial training period. Therefore, the 'BIT-2023 Executive Summary Book' stands as a symbol of our students' aspirations, their resilience in the face of new situations, and the unwavering support of our faculty and industry partners.

I extend my heartfelt gratitude to all the students, the Vice-Chancellor, Dean of the Faculty, staff members, and our industry collaborators who have made this program a resounding success. Together, we have embarked on a journey of learning, growth, and innovation, and this book serves as a tribute to that shared endeavor.

I invite you to delve into the pages of this book and witness the impact of experiential learning on our students' lives. Let us celebrate their achievements and anticipate the promising pathways that lie ahead.

Dr. K. M. Mewan
In-Plant Training Coordinator, Department of Biotechnology

Table of Content

EXPLORING THE FEASIBILITY OF REPLACING PRE-CHLORINATION WITH A COST-EFFECTIVE AERATION PROCESS IN KONDUWATTUWANA WATER TREATMENT PLANT

A. R. F. R. AFREEN

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 supplies treated water from the Konduwattuwana reservoir to a significant region in the Ampara district. Regular monitoring of the water treatment plant process is important to ensure the delivery of drinking water as per the SLS 614:2013 standard to the public. The primary objective of the water treatment plant is to remove the different impurities in raw water and maintain the drinking water standards in treated water. The maximum production capacity of the treatment plant process is 72000 m^3/day, involving a series of treatment processes. Among these, pre-chlorination emerges as a pivotal process encompassing oxidation of metallic ions, volatile gas removal, and taste, color, and odor control. In 2020, an incident was reported that the raw water had been contaminated with iron and manganese ions. The existing pre-chlorination process demands a high amount of chlorine to oxidize the ions such as ferrous (Fe^{2+}) into ferric (Fe^{3+}) and manganese (Mn^{2+}) into manganic (Mn^{4+}). This process generates toxic by-products such as trihalomethanes and algal toxins. Hence, this study is focused on the introduction of an aeration process as an alternative to the pre-chlorination process to minimize the treatment cost. The aeration process naturally allows the oxidation of metals, volatilization of gas, and an increase in dissolved oxygen which reduces the taste, color, and odor. Furthermore, it has been anticipated that the main cost will be associated with constructing the aeration systems, with minimum maintenance expenses. Therefore, this project is expected to reduce the cost of the pre-chlorination process by 50% and enhance overall efficiency.

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

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

IDENTIFYING THE CAPABILITIES OF THE ROTOR-GENE Q, THE REAL-TIME PCR MACHINE AT GENETECH, SRI LANKA

S. M. Amath

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

Abstract

Genetech is a pioneer establishment in Sri Lanka in the field of molecular life sciences that enables the public to access the benefits of biotechnology. The organization considers the use of Polymerase Chain Reaction (PCR) as one of the key processes for providing accurate and rapid results in their routine molecular diagnostic applications. Apart from the conventional PCR instruments used for this purpose, Genetech owns a Real-time PCR machine, the Rotor-Gene Q 5-plex. Although this instrument is currently used for general Real-time PCR assays, the organization required further in-depth understanding of its benefits and capabilities specifically to be used in applications such as multiplexing. Therefore, this study was aimed to do a comprehensive study on the benefits of the unique design and functional capabilities of the Rotor-Gene Q as a guide in enhancing their future Real-time PCR assays. The Rotor-Gene Q has a uniform thermal and optical performance, increased throughput and requires low maintenance due to its unique rotary format. Not only due to its design but also its user-friendly software, the Rotor-Gene Q allows multiple analysis procedures, making it suitable for a wide range of applications in gene expression analysis, genotyping, pathogen detection and many other research areas. This includes performing melt curve analysis, high-resolution melt (HRM) analysis, end-point analysis, concentration analysis and multiplexing. Typically, the Rotor-Gene Q has a choice of six channels thereby delivering the widest optical range currently available. So, the Rotor-Gene Q 5-plex has five channels and hence supports those functionalities including multiplexing up to 4-plex. However, it cannot perform HRM analysis due to the absence of that specific channel.

Industrial Supervisors: *Ms. Y. S. Wahalathanthri, Scientist/ Quality Manager, Genetech, Colombo 08.*

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

SUGGESTIONS TO MINIMIZE THE VARIATION OF THE VISCOSITY FROM SODIUM LAURYL ETHER SULPHATE (SLES) AS A RAW MATERIAL IN COSMETIC PRODUCTION IN ACE HEALTHCARE (PVT.) LTD

M. V. Deshani

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

Abstract

ACE Healthcare (Pvt.) Ltd is a leading Cosmeceutical and Pharmaceutical manufacturing plant in Sri Lanka and it was established in 2019 with the aim of catering to the local and global demand. The quality control laboratory plays a major role to analyze and maintain the quality of cosmeceutical and pharmaceutical products. Sodium Lauryl Ether Sulphate (SLES) is a raw material that is used for cosmeceutical products like shampoo, facewash, dishwash and *etc.* as a primary surfactant. However, the viscosity of these products is varied due to the SLES percentage and the cost of production has become a major issue due to the adjustment of viscosity and running expenses for chemicals and equipment. As raw material, 70% and 28% SLES are mostly used and the viscosity of the raw material also changes from time to time. The 28% SLES is produced from a dilution method and the dilution process of SLES can vary depending on different suppliers and the presence of electrolytes like Sodium Chloride; an ingredient of products that can directly affect SLES which is the main cause of the change in the viscosity. Therefore, this project proposes, suggestions to minimize the viscosity variation from SLES by reducing the electrolyte amount according to the product and introducing a new machine for the dilution process of SLES to 28%, as a cost-effective method for the company. Therefore, this project will be important to improve efficiency and reduce the cost of production in the company.

Industrial Supervisor: *Mrs. R. P. Charitha Iroshini, Executive Quality Control, ACE Healthcare (Pvt.) Ltd, Horana.*

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

PREPARATION OF SHE MAPS TO ENHACE AWARENESS ON HAZARDS OF MILK AND VENDING MIX FILLING MACHINES TO ENSURE HUMAN SAFETY

W. A. C. Dissanayake

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

Abstract

Nestlé is a Swiss company in the food, beverage, nutrition, and wellness business. Nestlé commenced trading in Sri Lanka with condensed milk and infant food products in 1906. According to the International Labour Organization (ILO), more than 337 million accidents happen on the job each year and more than 2.3 million deaths were recorded annually. In Nestle, operational safety is the first priority. This case study examines the accident statistics for the period between January 1st and May 31st, 2023. The goal is to calculate the percentage of accidents, identify their root causes, and conduct an analysis through the preparation of a Safety, Health, and Environment (SHE) map to enhance safety measures. The SHE maps signifies hazards in each and every operational area including milk filling and vending mix filling. Workplace hazards could be categorized into area hazards, environmental hazards, and health hazards. The purpose of preparing SHE maps is to quickly convey information regarding workplace hazards, machinery equipment, safety precautions, and the method of handling waste to a person who newly arrives at the plant. Furthermore, it displays what kind of Personnel Protective Equipment (PPE) allocated for each hazardous point, what are the 'Lock Outs and Tag Outs' (LOTO) points, what are power sources available, and where the emergency stop is located. Considering the areas covered, there were 10 filling lines and each line had different types of hazards. After the preparation of SHE maps, it was reviewed by the responsible person in the Safety Department, and approval was granted. Then prepared SHE maps were displayed on each line.

Industrial Supervisor: *Mr. T. A. Nilan Vimukthi Thenuwara, Assistant Manager– Production Manufacturing, Nestle Lanka PLC.*

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

MARKET SAMPLE ANALYSIS OF SOAP

E. P. L. M. Ediriweera

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

Abstract

In HEMAS, Fast Moving Consumer Goods (FMCG) produce, personal care, home care, skin care, hair care cosmetics, and household products where soap, categorized under personal care products had been the focus area of this case study. The case study involves an analysis of baby and adult soap samples aiming to facilitate a quality comparison between competitors' products and company products to get an insight into the current standing and to compete with the market. The quality assessment tests performed by following the guidelines and procedures outlined in the Sri Lanka Standards Institution (SLSI) are Total Fatty Matter (TFM), Ethanol Insoluble Matter, pH, Foam, Mushness, Rate of wear Test, and Gas Chromatography (GC) test. The test results indicate most of the parameters of the samples are compliant with established SLSI standards. In baby soap, commercial product A shows the highest TFM value (78.20%) while commercial product J shows the lowest TFM value (76.48%) deviating from the standards. In the adult soap category, most of the parameters comply with the SLSI standards. Commercial product Q shows the highest TFM value (72.37%) while commercial product P shows the lowest TFM value (64.21%). According to the ingredient safety analysis, in baby soaps, commercial product G and in adult soaps, commercial product P shows the highest percentage (79%, 75%) of low hazardous ingredients while commercial product I and commercial product Q show the lowest percentage (60%, 40%). The conducted analysis shows that the company offers high Value for Money (VFM) for its products, dedication to quality assurance, and adherence to industry standards.

***Industrial Supervisor*:** *Mr. Chamal Wijesinghe, Senior Chemist, Department of Research & Development, HEMAS Manufacturing (Pvt) Ltd, Dankotuwa.*

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

DEVELOPMENT OF A DATABASE OF REGULATORY CIRCULARS, GUIDELINES AND APPLICATIONS REQUIRED FOR AGROCHEMICALS IN SRI LANKA

B. S. S. Fernando

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

Abstract

SunAgro LifeScience Limited was established in 2006 and currently functions as a fully subsidiary of Lankem Ceylon PLC, which plays a pivotal role in the agri-inputs industry. SunAgro encompasses a wide spectrum of markets, including crop protection chemicals, seeds, non-straight fertilizers, rubber latex stimulants, and growth promoters. It also conducts awareness programs for farmers to upgrade their knowledge. The research and development division deals with the approval of pesticide import licenses, certification processes, and regulation affairs. However, the regulatory and approval process has long procedures and many rules and regulations related to pesticides. Moreover, these requirements are often updated due to country and global conditions. The increasing demand for pesticides and the critical need for their safe and regulated importation necessitates a comprehensive and efficient system to manage guidelines, circulars, and applications pertaining to this process. Therefore, this project aimed to the creation of a user-friendly database, systematically cataloguing indispensable guidelines, circulars, and application materials. All required guidelines, circulars, and applications were collected using the Registrar of Pesticide (ROP) website and printed documents. These documents are entered into a database under various classifications using spreadsheet software. All the documents were linked separately with their classification which helped in easy access to the data. Its implementation yielded a dual advantage: expedited access to crucial data and an enhanced capacity for precision during the approval process. The database will be important to significantly improve the efficiency of the research and development in SunAgro and other Agrochemicals importation companies.

Industrial Supervisor: *Ms. D. A. U. H. Perera, Research and Development Executive, SunAgro LifeScience Limited, Colombo 10.*

Faculty Supervisor: *Dr. B. L. W. K. Balasooriya, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

EXAMINE THE POSSIBILITY OF EXTENDING SHELF LIFE OF HYDROCORTISONE 1% CREAM

H. N. C. Gimhani

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

Abstract

Astron Limited prioritizes enhancing Sri Lanka's healthcare manufacturing. Founded in 1956, it pioneered the nation's first pharmaceutical plant. The Quality Control Division of Astron plays a crucial role in maintaining product quality throughout the testing of raw materials and finished products in in-house laboratories at each stage of production before they reach consumers and healthcare professionals. Shelf life extension refers to sustaining product safety and quality, enabling longer storage while maintaining intended attributes. The present shelf life of Hydrocortisone 1% cream is stipulated at two years. This case study aimed to ascertain the possibility of extending the shelf life of Hydrocortisone 1% cream to a duration of three years. Hydrocortisone 1% cream is a topical medication commonly used to treat various skin conditions like eczema, contact dermatitis, and insect bites. Its active ingredient is hydrocortisone, a corticosteroid with anti-inflammatory properties. The cream's base is white petrolatum and emulsifiers, stabilizers, and preservatives ensure a consistent and stable product. The present study examined three separate hydrocortisone 1% cream batches, with three replicates. A UV absorbance-based method was applied for the comparative analysis of a hydrocortisone cream sample with a standard hydrocortisone sample, assessing the concentration of the active ingredient. It provides the quantitative approach to confirm the presence and concentration of the active ingredient in the cream remains stable and effective throughout its extended shelf life. Hence, this study will play a crucial role in minimizing waste, and improving cost-efficiency, while optimizing supply chain management and enhancing consumer convenience.

Industrial Supervisors: *Mr. Pasindu Alwis, Manager, Quality Control Division and Mr. Rohan Paranawithana, Junior Executive, Quality Control Division, Astron Limited, No. 688, Galle Road, Ratmalana.*

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

IDENTIFYING AND MINIMIZING THE WEAKNESSES OF HISTAMINE ANALYSIS IN FOOD TESTING AT THE SGS LANKA PRIVATE LIMITED, COLOMBO

A. R. H. M. Gunarathna

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

Abstract

SGS (Société Générale de Surveillance) originated in France in 1878 and SGS Lanka was established in 1996. SGS engages in inspection, verification, testing, and certification services. This project aimed to identify and propose suggestions for the weaknesses of histamine analysis in food testing. In histamine analysis usage of rubber and glassware can cause interferences to the test results as rubber and silica bind with the OPT (o-phthalaldehyde) dye. It can be recommended to use plastic pipette fillers and plastic volumetric flasks to avoid this problem. The conventional histamine analysis method is time-intensive. For example, an analyst can handle five samples per test and it takes about 4 hrs to complete the protocol. The time duration can be significantly reduced by adopting AOAC (Association of Official Agricultural Chemists) approved ELISA (Enzyme-linked immunoassay) testing methods which can give results rapidly in 30 minutes. Therefore, adopting such a technique can improve the productivity of the analysts and the capacity of the laboratory. In addition, the resin used for separating the histamine contingent has an issue as the resin does not fit with the standard 6 mm diameter and 8cm height columns. This leads to poor reproducibility of the results and separation also may not occur accurately. Therefore, it is recommended to optimize the amount of resin in column packing and level the column allowing smooth packing of the column. The project was able to identify several weaknesses and ways to minimize them to improve the efficiency of the histamine analysis in food testing at SGS Lanka Private Limited.

Industrial Supervisor: *Mrs. Indumini Peiris, Manager, Chemical Laboratory, SGS Lanka (Pvt) Ltd, Colombo 2.*

Faculty Supervisor: *Dr. B. L. W. K. Balasooriya, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

DETERMINATION OF DIFFERENT STABILIZERS TO ENHANCE THE SOLUBILITY OF INTRAVENOUS IMMUNOGLOBULIN USING FPLC

P. N. Hewapathirana

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

Abstract

The Institute of Biochemistry, Molecular Biology, and Biotechnology (IBMBB) was established as an independent Institute of the University of Colombo. The main objective of the institute is to provide centred training in current zones of molecular life science pertinent to the advancement of Sri Lanka. Intravenous immunoglobulin (IVIG) is a pooled antibody obtained from large numbers of healthy donors as a biological therapy for the treatment of various immunodeficiency states. IVIG products are prepared using the Cohn-Oncley procedure, in which the initial step is cold ethanol precipitation used to advance the IgG from the plasma of donors. The IVIG product varies depending on the excipients used. Maltose is frequently added to commercially available IVIG products at levels of 10% to maintain product stability. The main problem is that its stability and solubility deteriorate with time. Therefore, IVIG solutions need to be in a soluble and homogeneous form. Stabilizers can enhance the solubility of proteins and maintain the solution's stability. A sample of IVIG was taken, and 10% maltose was added. After that, different types of stabilizers, such as D-sorbitol, tween 80, glycine, and glycerol were used. Each sample was dissolved in 10% maltose containing IVIG and centrifuged, and the supernatant was obtained. The Fast Protein Liquid Chromatography (FPLC) technique was used to analyze protein samples. After that, results were determined based on their peak areas compared to a standard IgG sample. Therefore, it is important to ensure stability and solubility, which are vital attributes of IVIG samples, especially for patients with immunodeficiencies.

Industrial Supervisor: *Prof. O. V. D. S. J. Weerasena, Senior Professor in Molecular Biology, Institute of Biochemistry, Molecular Biology and Biotechnology (IBMBB), University of Colombo.*

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

MANAGEMENT OF HIGH TURBIDITY IN SURFACE WATER OF KALU GANGA FOR INDUSTRIAL USAGE

K. H. Madanayake

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

Abstract

The Central Environmental Authority (CEA) of Sri Lanka regularly monitors the water quality of surface water bodies through a network of water quality testing laboratories. Kalu Ganga which is originated from Adam's Peak and flows through Ratnapura and Kalutara districts supplies drinking water and water for industrial and other uses at number of extraction points. The water quality of Kalu Ganga is assessed three times a year at 12 sites; Gileemale, Malwala, Warakathota, Muwagama, Kurugammodara, Heraniyawaka, Ella, Halwathura, Kandana, Narthupana, Kethhena, Kalutara. The maximum level of turbidity for water that requires simple treatment before drinking purposes is 5 Nephelometric Turbidity Unit (NTU) according to the CEA ambient water quality standards. However, the turbidity values in recent years (2021-2023) are drastically higher (9.5-103 NTU) than the threshold value. High turbidity has been linked with conventional gem mining methods such as river bed dredging and sand mining. In the process of treating water, alum is used as a flocculent to remove undesirable colour and turbidity. Increased alum usage, which raises the price of water treatment, is a concern on an industrial scale. In addition, the presence of residual alum in treated water is also not favourable. To reduce manufacturing costs while maintaining effective water treatment, it is necessary to determine the least amount of chemicals. Therefore, this study suggests conducting jar tests using a range of Alum (5%) dosages on water samples to determine the least amount of coagulant required for optimum water treatment.

Industrial Supervisor: *Mrs. G. C. Priyadarshani, Chemist, Water Quality Laboratory, Central Environmental Authority, Battaramulla.*

Faculty Supervisor: *Dr. B. L. W. K. Balasooriya, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

COMPARATIVE ANALYSIS OF COUMARIN CONTENT AGAINST THE BARK THICKNESS OF CEYLON CINNAMON (*CINNAMOMUM ZEYLANICUM* BLUME)

T. H. H. Nimasha

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

Abstract

Coumarin is an aromatic compound and secondary metabolite present at ultra-trace levels in Ceylon cinnamon (*Cinnamomum zeylanicum* Blume) which has a range of hepatotoxic properties. The discovery of carcinogenic features of coumarin has increased the restriction of high consumption in human diets. The main source of the coumarin in human diet is cinnamon. This study is focused on quantification of the variation in coumarin content against the bark thickness of Ceylon cinnamon. This approach is to quantify the coumarin content by HPLC (High Performance Liquid Chromatography) method and recognize the relationship between the coumarin content variation against the bark thickness. This study was based on cinnamon quills collected from two locations of the Galle district in Sri Lanka. Pulverized cinnamon was (sieved through a 300 µm strainer) extracted by 70% methanol by sonication process and syringe filtered prior to analysis by HPLC. Results of the method validation indicated that the method has high linearity within the concentration range from 0.386 mg/kg to 12.375 mg/kg (R2 =0.99). Further, it has shown repeatability in 12.375 mg/kg, 1.56 mg/kg and 0.390 mg/kg respectively. The results revealed that the LOD value was 1.58 mg/kg and LOQ value was 1.632 mg/kg. On the other hand, the coumarin content of the quills of cinnamon ranges from 1.62 mg/kg to 8.32 mg/kg in samples. Moreover, the coumarin content of the Ceylon cinnamon exhibits an increment with the increasing trend of bark thickness.

Industrial Supervisor: *Dr. H. D. Weerathunge, Senior Research Scientist, Herbal Technology Section, Modern Research and Development Complex, Industrial Technology Institute (ITI), Malabe.*

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

ANALYSIS OF TWO DIFFERENT PHOSPHOROUS DETERMINATION METHODS

H. C. M. Perera

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

Abstract

Ceylon Grain Elevators PLC is a prominent Sri Lankan company that manufactures and sells in the animal feed and poultry industry. In addition, the company plays a pivotal role in the poultry sector by managing poultry farms, hatchery breeder farms, and facilities dedicated to raising grandparent and parent stock as well as hatcheries for producing day-old chicks. It engages in the entire value chain of the poultry meat production industry. The company also provides a state-of-the-art laboratory and consultancy service to customers and farmers throughout the island. Animal feed production operations involve the utilization of Dicalcium phosphate (DCP) as a raw material source of phosphorous which is imported from China. There are two methods used to determine the phosphorus, the Chinese method of DCP (GB/T 22548-2017) gravimetric analysis method and the (AOAC 965.17) colorimetric method. The gravimetric method is more complex and time-consuming than the colorimetric method. Therefore, mainly use the colorimetric method to determine the phosphorus in DCP commercial level. However, the supplier asks to test in (GB/T 22548 2017) method in DCP samples. Therefore, this project aims to determine whether there is a significant difference in results between these two methods. Five DCP samples were tested by the above two methods and the results were statistically analyzed by performing a simple T-test. The means of (AOAC 965.17) and (GB/T 22549-2017) methods were 17.624 and 17.502 respectively, with a p-value of 0.4443, which is greater than the common significance level of 0.05. There is no significant difference between the means of the two treatments. This project significantly addresses maintaining consistent product quality, contributing overall advancement of the industry.

Industrial Supervisor: *Dr. T. Jayawardena, Senior Manager, Department of Quality Assurance and Technical, Ceylon Grain Elevators PLC, Colombo.*

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

REDUCTION OF PRINTING RELATED DEFECTS IN CHICKEN SEASONING POWDER JARS

P. A. C. S. I. Pitumpe

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

Abstract

Nestle Lanka PLC's culinary plant produces various products, including chicken seasoning powder. The process involves mixing raw materials as per the recipe, filling and packing the seasoning powder pouches, and manually inserting the sealed pouch into each jar. However, a significant concern arises from the wastage of jars due to defects in the printed code. To address this issue, the objective was set to reduce coding-related defects in jars. The main root causes of the issue were identified as overlapping codes during manual feeding of jars, codes printed on the wrong side due to incorrect placement of jars, codes printed in improper positions due to some defects on the conveyor belt, and misalignment of codes to the right or left due to adjustments in printer settings. In the next phase, systematic actions were planned and implemented to develop preventive and sustainable solutions. One Point Lessons (OPLs) were created to share knowledge and guide casual labourers in correctly placing jars along the conveyor belt. A training program was organized to give casual labourers the necessary skills to minimize printing defects. The settings of the jar code printer were also standardized. Furthermore, the current conveyor belt was inspected, leading to a recommendation to replace it with a smoother belt. It is expected that the systematic actions taken will significantly reduce printing-related defects, and their effectiveness needs to be verified.

Industrial Supervisor: *Mr. Piushan Gunasekara, Assistant Production Manager, Nestle Lanka PLC, Makandura, Gonawila.*

.

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

VARIATION OF GC PROFILE OF CEYLON CINNAMON (*Cinnamomum zeylanicum* BLUME) BARK OIL WITH THE BARK MATURITY

E. G. S. M. Premachandra

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

Abstract

Ceylon cinnamon, also known as "True cinnamon", is a type of spice derived from the inner bark of the cinnamon tree, which is native to Sri Lanka. Cinnamon bark oil (CBO) is derived from the bark of the cinnamon tree. Cinnamaldehyde, α-pinene, β-phellandrene, and benzyl benzoate are some of the major components commonly found in cinnamon bark oil. This study was carried out to evaluate the GC (Gas Chromatography) profile of CBO with the thickness of the dry bark as a factor to measure the maturity of the bark. Cinnamon bark samples were collected from the Galle district. Dry bark thickness was measured using Vernier caliper and CBOs were extracted by using hydro distillation by Clevenger apparatus. CBOs were analyzed by Gas Chromatography-Flame Ionization Detector (GC-FID) and Gas Chromatography-Mass Spectrometry (GC-MS). As per the GC-FID analysis data, percentages of cinnamaldehyde were increased and α-pinene, β-phellandrene, and benzyl benzoate were decreased with the average thickness under 0.5 mm to 4.5 mm range of dry bark thickness. These dry bark thicknesses are related to a normal cultivated maturity range (2 to 5 years) of the cinnamon stem. Nevertheless, some exceptional cases were reported with more than 4.5 mm bark thickness values. In such instances, cinnamaldehyde values were decreased and α-pinene, β-phellandrene, and benzyl benzoate values were increased. These heavy barks were collected from 5- 20 years old trees. Considering the above GC aroma profile, 2-5 years matured stems were recommended to prepare cinnamon quills with high-quality CBO with unique aroma and fragrance. Further, 5-20 years matured stems were recommended for high-quality CBO preparation for food processing.

Industrial Supervisor: *Dr. H. D. Weerathunge, Senior Research Scientist, Herbal Technology Section, Modern Research and Development Complex, Malabe.*

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

ASSESSMENT OF THE POSSIBILITY OF RECOMMENDING THE GENE THERAPY, ANTISENSE-INDUCED EXON SKIPPING, TO PATIENTS WITH DUCHENNE MUSCULAR DYSTROPHY (DMD)

R. P. D. M.Rajapaksha

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

Abstract

Duchenne Muscular Dystrophy (DMD) significantly impacts male newborns and is a major contributor to childhood neurodegenerative disease mortality. This X-linked recessive disorder stems from loss-of-function mutations in the Dystrophin gene on chromosome Xp21, encoding the dystrophin protein through 79 exons. Inadequate dystrophin weakens molecular bonds by disrupting the Dystrophin Associated Protein Complex (DAPC). The majority of disease-causing mutations entail exon deletions (65%) and duplications (6%), while point mutations are less frequent. The present study was to determine the deleted or duplicated exon types of patients who are suffering from DMD and assess the possibility of recommending antisense-induced exon-skipping gene therapy for them. Blood samples were collected from fifty Duchenne Muscular Dystrophy (DMD) patients at Genetic Laboratory, Asiri Surgical Hospital PLC. Following DNA extraction, the samples underwent Multiplex Ligation-dependent Probe Amplification (MLPA) analysis. Subsequently, fragment analysis was processed according to the Capillary electrophoresis method using a 3130 Genetic Analyzer and data analysis was conducted using the Coffalyser software program. Among the total sample of 50 individuals, genotyping identified deletions in 44 (88%) children and duplications in 6 (12%) children. The most prevalent deletion was a three-exon deletion ranging from exons 48 to 50, observed in 6 (12.0%) children. Within the subset of 44 patients with DMD deletions, approximately 69.95% demonstrated potential responsiveness to exon skipping, while 30.05% were less likely to respond. Consequently, antisense-induced exon-skipping gene therapy presents a promising avenue, potentially effective for treating around 69.95% of patients afflicted with Duchenne Muscular Dystrophy Deletion.

Industrial Supervisor: *Prof. Vajira Dissanayake, Head of the Department, Asiri Centre for Genomic Medicine and Regenerative Medicine, Asiri Surgical Hospital PLC, Colombo.*

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

CASE STUDY ON THE FACTORS AFFECTING WATER DISCOLORATION OF THE ARTIFICIAL POND ESTABLISHED IN THE NARA PREMISES

R. M. D. Rathnayake

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

Abstract

The identified study problem is the frequent discoloration of water in the artificial pond situated in the main entrance area of the National Aquatic Resources Research and Development Agency (NARA) premises. According to the service and operation division data, the pond size is approximately 60 ft × 61 ft × 5 ft. The routing cleaning process is done once every eight months and new water is replaced using the pumping process as no automated cleaning system is activated inside the pond. But after 2-3 days of cleaning, the side walls and the water are turned into green colour. However, adopting a daily cleaning procedure is also not possible as it is very costly and laborious. Though the heavy green algal growth leads to the turbidity of the pond, carp fish survive in the water without any lethal damage. It indicates that carps can survive in eutrophic waters without any harm. The major reason for this discoloration is pigeons' droppings as they fly over the pond and rest on the bridges of the pond. Besides, the rainwater washed away with pigeon's waste from the roofs is directly added to the pond. Due to the above reasons, nitrate, phosphate concentrations and phytoplankton growth in the pond water are increased leading to the eutrophication of the pond. Developing surface aerators in this irregular-shaped pond is the suggested methodology to control the continuous discoloration of the pond. Aeration promotes the spatial mixing and vertical mixing of water which increases the water quality and reduces phytoplankton growth respectively. Further, proper systems to drain rainwater from the roofs to avoid contamination of the pond water are recommended.

Industrial Supervisors: *Dr. Yasmin Chathurika Aluwihare, Scientist, Marine Biological Resources Division (MBRD) and Dr. K. A. W. Shyamali Weerasekara, Head/ Principal Scientist, Environmental Studies Division (ESD), National Aquatic Resources Research and Development Agency (NARA), Crow Island, Mattakkuliya, Colombo 15.*

.

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

INTRODUCING SUBSTITUTE FOR THE CONVENTIONAL MUD BUNDED IRRIGATION CANAL IN RICE RESEARCH STATION, LABUDUWA

S. T. D. T. Salpadoru

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

Abstract

Labuduwa Rice Research Station (RRS) is a satellite station of the Rice Research and Development Institute, Batalagoda. The mandate of the research station is to develop high-yielding rice varieties for the potential paddy lands of Low Country Wet Zone, associate with the technology development, breeder seed production and disseminate the relevant technologies to the required parties. Rice is a semi-aquatic plant and therefore, irrigation plays a major role in paddy cultivation. Therefore, building and maintaining canals and bunds around the fields is essential for proper water management to have a better crop stand. In Labuduwa RRS, irrigation management is done through conventional irrigation and drainage canals and bunds made out of mud. However, over time, these bunds collapse due to cracks and rat holes, facilitate host plants for pests, and cause difficulties in the data collection and regular inspection of the fields. For the maintenance of the mud bunds, needs continuous repair and grass cutting. Furthermore, irrigation water could be lost through percolation and seepage causing several disadvantages to the smooth running of the research trials. As a solution, it is suggested to substitute existing mud bunds with permanent, concrete canals. This will be advantageous for the research station in the long run by reducing the cost of maintenance and repair while enhancing the efficiency of water usage. Therefore, adopting this suggestion of constructing of permanent irrigation system with concrete canals will significantly reduce the cost incurred in the maintenance of mud bunds, while enhancing the efficiency of the research station in continuing research trials in the future.

Industrial Supervisor: *Dr. M. C. Millawithanachchi, Assistant Director of Agriculture, In charge, Rice Research Station, Labuduwa.*

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

AN APPROACH TO ENHANCE THE EXISTING WASTEWATER TREATMENT SYSTEM AT ISLAND DAIRIES (PVT) LTD.

M. B. F. SAMLA

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

Abstract

Island Dairies (Pvt) Ltd. is a well-established medium-scale facility located in Ranwala. Since 1984, the organization has steadily grown over 39 years, becoming a prominent industry. The company produces a wide range of fermented dairy products, ice cream, and milk sachets. Due to its substantial water consumption, the company faces significant wastewater generation, which contains high amounts of organic compounds such as fats, proteins, and carbohydrates thus high BOD and COD levels. The existing wastewater treatment process is not sufficient to effectively remove these organic loads and meet the threshold levels of pollutants in the discharged effluent after treatment. This proposal outlines an upgraded method to reduce the BOD and COD of wastewater to meet the standard levels. The establishment of a trickling filter along with a diffused air system as an additional step in the existing treatment system is proposed to amplify the biological treatment. The integrated process will enhance the decomposition of organic components present in the wastewater, resulting in their rapid conversion into carbon dioxide, water, and microbial biomass. The trickling filter is an aerobic treatment system that utilizes microorganisms attached to a medium as a biological film for bio treatment which is simple to build and operate. Packed plastic filters (bio-towers), in different configurations such as vertical flow, cross flow, and random arrangements will serve as a support medium to promote intensified microbiological growth. Enhanced oxygenation is introduced via a diffused air system to stimulate microbial growth from the bottom of the waste water tank.

Industrial Supervisor: *Mr. Asitha Mayurapaksha, Production Manager, Island Dairies (PVT) LTD, Kegalle.*

Faculty Supervisor: *Dr. B. L. W. K. Balasooriya, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

IMPROVING THE ENERGY EFFICIENCY OF THE NIFS USING SOLAR ENERGY

R. P. H. Senanayake

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

Abstract

National Institute of Fundamental Studies (NIFS), Kandy is a government institute established in September 1981. The NIFS conducts multidisciplinary research that contributes to the advancement of science and national development. One of the major problems they face as a research institute is high energy consumption. In the institute, there are many equipment that consume a high amount of energy. As a remedy, a solar power system was established in 2018 using government funds with a 20-year warranty. The solar panel system consists of four inverters and has a 150 kW feed capacity. The energy generated cannot be used directly in the institute, it must feed the CEB commercial line by synchronizing it with their wave frequency. Then, the CEB will deduct the cost of the corresponding units from the institute's consumption. The solar system is continuously monitored using software and reports electricity generation, efficiency, idle panels and carbon emissions. At present, the solar power system has reduced the monthly energy cost of the institute by over 50%. The main drawback of the system is that it cannot work when there is a power failure. In addition, the solar panel system cannot meet its 100% efficiency because the energy generation depends on the light intensity, the angle of the sunlight and the weather. The solar panels should be protected from animals like monkeys and should be cleaned regularly to ensure better performance of the system.

Industrial Supervisors: *Prof. G. Seneviratne, Head/Senior Research Professor, and Dr. Mahesh Premarathna, Postdoctoral Research Fellow/ Coordinator, Microbial Biotechnology Unit, National Institute of Fundamental Studies, Kandy.*

Faculty Supervisor: *Dr. B. L. W. K. Balasooriya, Senior Lecturer, Department of Biotechnology, Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka.*

ISOLATION OF COMPOST-DECOMPOSING FUNGI AND BACTERIA FROM COMPOST

H. A. V. Silva

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

Abstract

Agricultural Research Institutions are pivotal for enhancing crop productivity and global food security. This article provides a comprehensive account of a two-month immersive in-plant training at the Regional Rice Research and Development Center in Bombuwala, focusing on the isolation of microorganisms responsible for the decomposing of compost. The center's visionary mission aims to transform rice cultivation for a growing global population through sustainability, encompassing improved crop yields, reduced environmental impact, and resource-efficient farming practices. The aim of the case study within the training focused on isolating compost-decomposing fungi and bacteria, vital for nutrient cycling and soil health which is fully aligned with the visionary mission of the center. This process commenced with suspending 10 g of compost in 90 ml of sterilized water and agitating for 20 min. A dilution series from 10^{-1} to 10^{-6} was prepared, and 100 ml from 10^{-4} to 10^{-6} dilutions were spread on culture media using the spread plate method. Nutrient Agar (NA) and Potato Dextrose Agar (PDA) media were fostered for bacterial and fungal growth respectively and incubated at 37 ºC for 24 hours. Colonies were identified by visual traits and were isolated *via* streak plate technique and subculturing. A total of fifteen (15) different fungi and eight bacteria were isolated. Those purified fungi cultures were preserved in PDA slant tubes and purified bacteria samples were preserved in NA slant tubes under the refrigerator conditions for further studies. This approach successfully identified compost-degrading microorganisms with the potential to enhance plant health.

Industrial Supervisor: *Miss. T. G. I. Sandamali, Assistant Director of Agriculture (Research), Regional Rice Research and Development Centre, Bombuwala.*

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

ASSESSING THE FREQUENCY OF THE MYELOPROLIFERATIVE NEOPLASM (MPNs) MUTATIONS IN A SELECTED POPULATION USING MULTIPLEX LIGATION DEPENDENT PROBE AMPLIFICATION (MLPA) METHOD

S. Sivashoby

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

Abstract

The increasing knowledge about genetic alterations and molecular biomarkers in cancer initiation and progression opens new possibilities for the treatment of various types of cancer. Myeloproliferative neoplasms (MPNs) are considered as most frequent disorders among cancer patients. The study describes the frequency of major genes implicated in leukemic transformation by mutation among MPN patients in Asiri Centre for Genomics and Regenerative Medicine, Asiri Surgical Hospital. Test results of forty-three MPN patients from January 2023 to August 2023 were maintained prospectively in a database and analyzed retrospectively. The Multiplex-ligation dependent probe amplification (MLPA) method was performed to detect the somatic mutation, where PCR amplicons are fluorescently labelled, separated and quantified by capillary electrophoresis. The results were analyzed using "Coffalyser" software. Among the MPN-positive patients, JAK2p.V617F, CALRp.L367fs*46 and CALRp.K385fs*47 gene mutations were found in 76.74%, 16.28% and 4.65%, respectively and 2.32% had only MPLp.W515L mutation. However, no one detected the mutations for MPLp.W515K, KITp.D816V and mutation for JAK2 in exon 12 within six months. The study revealed that a significant amount patients had Myeloproliferative neoplasms. The results showed that the highest frequency of mutation belongs to JAK2p.V617F. The study was undertaken to determine the dominant somatic mutation and it enabled proper diagnosing and treatment.

Industrial Supervisor: *Prof. Vajira H. W. Dissanayake, Head of the Department, Asiri Centre for Genomic Medicine and Regenerative Medicine, Asiri Surgical Hospital PLC, Colombo.*

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

DEVELOPMENT OF SPATIAL DISTRIBUTION MAPS FOR BIOFILM BIOFERTILIZER AND CHEMICAL FERTILIZER PRACTICES IN PADDY CULTIVATION IN SRI LANKA

H. W. W. M. U. S. Thalgodapitiya

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

Abstract

As the premier research institute in Sri Lanka, the National Institute of Fundamental Studies (NIFS) conducts multidisciplinary research for the scientific advancement and national development of the country. The microbial biotechnology research programme (MBU) is one of the major research programmes among the 19 ongoing research programs at the NIFS. The MBU has developed a biofilm-based biofertilizer called biofilm biofertilizer (BFBF) for agriculture and plantation crops (especially non-legumes, *e.g*. tea, rice, vegetables, *etc*.), which was tested extensively under field conditions, and commercialized in 2014. The BFBF is currently been used for over 0.11 Mha of paddy cultivation (*i.e*. ca. 16% of total cultivation) in the country and cut down the usage of chemical fertilizers up to 50 % while increasing grain yield up to 20-30%. The MBU has a large experimental database of soil, plant, microbial, and plant growth and yield parameters, obtained from 105 field trials conducted in 16 districts from 2018 to 2023. The larger size and complexity of the database make it more difficult to understand the spatial variation of experimental parameters. Therefore, the current study aimed to develop spatial distribution maps using the geographic information system (GIS) to understand the geostatistical variation of the parameters. Results revealed that soil carbon, plant growth and yield were significantly increased with the BFBF application in all 16 districts with different soil and climatic conditions. These results indicate the potential of BFBF for ecofriendly sustainable paddy cultivation in Sri Lanka.

Industrial Supervisors: *Prof. G. Seneviratne, Senior Research Professor/Head, and Dr. M. Premarathna, Postdoctoral Research Fellow/Coordinator, Microbial Biotechnology Unit, National Institute of Fundamental Studies, Hantana Road, Kandy*

.

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

IMPROVE THE SUCCESS RATE OF SEMI-MICROGRAFTING PROPAGATION FOR THE *CITRUS TRISTEZA* VIRUS

P. D. Weerasinghe

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

Abstract

In 1999, the Department of Agriculture established the Plant Virus Indexing Centre (PVIC) to investigate organisms that harm fruit crops. The Molecular Virology Division at PVIC was conducting a semi-micrografting propagation project for the *Citrus tristeza* virus. The survival rate was less than 4.76% because no growth hormones were used during semi-micrografting. To address this issue, a new low-cost technique was developed. The approach involved using *Citrus aurantium* (Sour orange) as rootstock, while shoot tips from infected *Citrus* species served as the scions. Before the grafting process, the rootstocks were treated with a 0.15% mg/L ascorbic acid solution and the scions with a 0.3% mg/L gibberellic acid solution to successfully suppress rootstock browning and scion desiccation, allowing the rootstocks and scions to remain fresh for 14 days until semi-micrografting was achieved. The top wedge grafting technique was used, and the scions were secured to the rootstocks by applying 1% agar solution and covering it with a parafilm. The new approach successfully suppressed rootstock browning and scion desiccation, and 28 out of 30 subjects survived after semi-micrografting.

Industrial Supervisor: *Dr. B. M. V. S. Basnayake, Deputy Director (Research), Molecular Virology Division, Plant Virus Indexing Centre, Gabadawaththa, Homagama.*

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

EXAMINE *ENTEROBACTERIACEAE* CONTAMINATION IN MALTED BEVERAGE MANUFACTURING PLANT IN THE PRODUCTION DEPARTMENT

K. P. A. K. Weerasiri

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

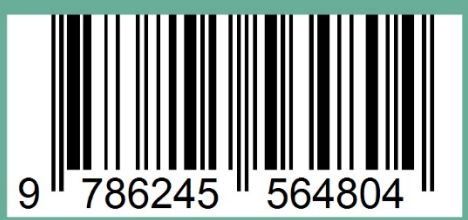
Abstract

This report presents a case study examining *Enterobacteriaceae* contamination in the malted beverage manufacturing process at Nestle Lanka PLC, Kurunegala Factory, from July 1st to August 15th, 2023. Nestle Lanka PLC has been well-known in Sri Lanka's food, beverage, and wellness sector since 1906. The production of malted beverages plays a major role in food safety and compliance. The report explores the key steps in malted beverage production. To ensure good manufacturing practices, the quality department conducts thorough tests for product excellence. The focus of the present study was on *Enterobacteriaceae* contamination during this period. Samples were collected after the wet cleaning process, alongside environmental specimens. The investigation found around 0.5% of samples tested positive. The report presents into reasons behind this contamination rate. Factors contributing to the contamination were found and analyzed. Notable issues include more big cleaning, deviations from the standard environment, use of improper gloves during assembly, and lack of storage for cleaned lines. All these led to more *Enterobacteriaceae-positive* samples. To tackle this, proactive steps were taken. These included considering new cleaning tool sources, talking with the quality department about better glove choices, and creating dedicated areas for storing cleaned kibble transport lines. The production process showcases how to find contamination sources, analyze causes, and apply solutions for product safety. The cooperation between departments, along with quick fixes, shows dedication to providing safe, high-quality items to customers.

Industrial Supervisors: *Mr. Chamara Udayakumara, Senior Executive- Production, and Mr. Prabash Dilhara, Plant Manager- Beverages, Nestle Lanka PLC, Kurunegala.*

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

ISBN 978-624-5564-80-4



Wayamba University Centre for Agri-Science Publications (WUCAP),
Faculty of Agriculture & Plantation Management, Wayamba University of Sri Lanka