

ABSTRACTS

OF RESEARCH PRESENTATIONS
8TH ANNUAL RESEARCH SESSION



Abstracts of the Research Presentations

FoodTechno 2024

8th Annual Research Session of IFSTSL

05th October 2024

Renuka City Hotel | Colombo 03



**Organized by the Institute of Food Science and Technology Sri Lanka
(IFSTSL)**

FoodTechno 2024

8th Annual Research Session of IFSTSL

05th October 2024

Renuka City Hotel | Colombo 03

Program

8:00 am - 8.30 am	Registration
8:30 am - 8:40 am	National Anthem and Lighting of the Oil Lamp
8:40 am - 8:50 am	Welcome address by the President of IFSTSL
8:50 am - 8:55 am	Introduction to FoodTechno
8:55 am - 9:10 am	Address by the Chief Guest - Mr. P.M.N.M Wickramasinghe, Secretary - Ministry of Agriculture, Lands, Livestock, Irrigation, Fisheries and Aquatic Resources
9:10 am - 9:40 am	Keynote address by Prof. Buddhi Marambe, Senior Professor - Faculty of Agriculture, University of Peradeniya
9:40 am - 10:10 am	Tea Break and Poster Viewing
10:10 am - 11:10 am	Plenary Session - I
11:15 am - 12:30 pm	Research session - I
12:30 pm - 1:30 pm	Lunch and Poster Viewing
1:30 pm - 2.45 pm	Research session - II
2:45 pm - 3:25 pm	Plenary Session - II
3:25 pm - 3:40 pm	Tea Break
3:40 pm - 3:50 pm	Presentation of Awards
3:50 pm - 4:00 pm	Closing Remarks & Vote of Thanks

FoodTechno 2024 - Plenary Sessions

Plenary Session I

Session Chair: Professor Ananda Chandrasekara

(Head, Department of Applied Nutrition, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka)

1. Moving from Student Research to Future - Prof. Upali Samarajeewa, Emeritus Professor - University of Peradeniya
2. Research and Economic Aspects of Sustainable Food Systems - Dr. Rohantha Athukorala, President - Clootrack Artificial Intelligence Global Company
3. Present Laboratory and Testing Capacity for Food Sector in Sri Lanka - Dr. Sudarshana Somasiri, Additional Director General – Technical Services, Industrial Technology Institute

FoodTechno 2024 - Research Sessions

Research Session I

Session Chair: Professor Eresha Mendis

(Professor, Department of Food Science & Technology, Faculty of Agriculture, University of Peradeniya)

1. Development of meat analogue using oyster mushrooms and enrichment with rice bran protein: extraction and characterization
Sandareka M.K. and Perera O.D.A.N.
2. Development of instant pudding mix using *Pentadesma butyracea* (African butternut) seed cake and evaluation of bioactivity and shelf life
Nishadhi, R.R., Binduhewa A.M.C.U., Samarasinghe U.K.A., Liyanaarachchi G.D., Vasantharuba S. and Kathirgamanathar S.
3. Awareness and compliance with food safety and quality legislation among Sri Lankan youth: a cross-sectional study
Samarasinghe S.A.I.I. and Buddhapriya A.N.
4. Detection of synthetic food colorants in confectioneries available in Gampaha district, Sri Lanka
Dilrukshi S.H.B. and Somapala E.G.

FoodTechno 2024 - Research Sessions

Research Session II

Session Chair: Professor Ilmi Hewajulige
(Director General, Industrial Technology Institute)

-
5. Development of grain-based meat analogue and analysis of sensorial and physical properties
Kariyawasam K.P., Wickramaarachchi L.A. and Herath H.M.T.
 6. Enhancement of quality attributes of selected local cereals and pulses to develop a milk substitute
Wijewardane R.M.N.A. and Wijesinghe K.D.B.V.
 7. Melamine detection in milk using green synthesized silver nanoparticles from red flowers of *Hibiscus rosa-sinesis*
Hussain Z., Kandiah M., Gunaratne B. and Perera O.
 8. Extraction, characterization and stability analysis of a marine-derived bacterial crude biopigment to be used as a natural food colouring agent
Peiris P.H.A., Aththanayake A.M.K.C.B., Priyadarshani W.M.D., Rajapakse M., and Udalamaththa A.V.L.K.
 9. Process optimization to extract essential oil and oleoresin from the different grades of cinnamon [*Cinnamomum zeylanicum* Blume] bark and screening of antioxidant activity, and essential oil composition
Madhawa J.K.R., Rajapakse R.P.N.P., Mendis B.E.P. and Harischandra T.

FoodTechno 2024 - Plenary Sessions

Plenary Session II

Session Chair: Dr. Nimsha Weerakkodi
(Senior Lecturer, Department of Agricultural and Plantation Engineering, Faculty of Engineering Technology, The Open University of Sri Lanka)

-
4. Challenges and the way forward for local Food Businesses - Mr. Nishan Perera, Chief Executive Officer - CMC Engineering Export GMBH
 5. Unexploited potential of export food business in Sri Lanka - Mr. Dhammika Gunasekara, Managing Director -Tropical Life Pvt. Ltd

List of Reviewers

1. Emeritus Professor Upali Samarajeewa, *University of Peradeniya*
2. Senior Professor K.K.D.S. Ranaweera, *University of Sri Jayewardenepura*
3. Prof. Anoma Chandrasekara, *Wayamba University of Sri Lanka*
4. Prof. Ananda Chandrasekara, *Wayamba University of Sri Lanka*
5. Prof. Niranjalie Perera, *Wayamba University of Sri Lanka*
6. Prof. K.D. Prasanna Gunathilake, *Wayamba University of Sri Lanka*
7. Prof. Madhura Jayasinghe, *University of Sri Jayewardenepura*
8. Prof. S. Vasantharuba, *University of Jaffna*
9. Dr. Darshika Pathiraje, *Wayamba University of Sri Lanka*
10. Dr. Nimsha Weekakkodi, *Open University of Sri Lanka*
11. Dr. T.C. Kananke, *Sabaragamuwa University of Sri Lanka*
12. Prof. Isuru Wijesekara, *University of Sri Jayewardenepura*
13. Mrs. J.W. Amanda Sajiwanie, *Sabaragamuwa University of Sri Lanka*

Message from the President of the IFSTSL



It is with great pride I welcome you to the 8th Research Session of the Institute of Food Science and Technology Sri Lanka - FoodTechno 2024. This event reflects our commitment to advancing the frontiers of food science, technology, and food innovation to address the pressing challenges of our time.

Food science and technology play a pivotal role in ensuring global food security, enhancing nutritional quality and safety, and promoting sustainable practices. In the face of evolving consumer demands, climate change, and the need for innovation, the research and ideas shared during this session will serve as a beacon for progress and transformation.

I applaud each of young researchers for your dedication to research and development. Your contributions through innovative solutions, and cutting-edge technologies, are vital in shaping a future where food systems are resilient, sustainable, and inclusive.

As you engage in these sessions, I encourage you to foster collaboration, challenge conventional thinking, and explore new paradigms with your colleagues and experienced resource persons and guests. The ideas cultivated here will not only benefit our academic and professional community but also have far-reaching impacts on the food industry in Sri Lanka.

As the president of the Institute of Food Science and Technology Sri Lanka, I wish to extend my sincere thanks to Prof Niranjana Rajapakse and Dr Sumudu Warnakulasuriya and the current Executive Committee of the IFSTSL, for their support to make Food Techno 2024 a great success. I extend a special thanks to Sri Lanka Food Processors Association for their generous support to IFSTSL to stage Food Techno 2024. Thank you for your participation and commitment to excellence. Together, let us strive to achieve our shared vision of a world where every individual has access to safe, nutritious, and sustainable food.

Prof. Anoma Chandrasekara

President / IFSTSL - 2024

Message from the Co-Coordinator FoodTechno 2024



FoodTechno 2024 - The Eighth Annual Research Session of the Institute of Food Science and Technology Sri Lanka (IFSTSL) held was on 05th October 2024 at the Renuka City Hotel, Colombo 03. The theme of this research session was 'Science for Sustainable Food Systems' with the objective of showcasing the applied research conducted in universities and research institutes across Sri Lanka to the food industry, fostering opportunities to leverage this research for industrial benefit.

This annual event offers a vital platform for key stakeholders in Sri Lanka's food sector to engage in research dialogue, fostering innovations that support a sustainable future. By participating in this research session, universities and research institutes involved in food science can gain valuable insights into the relevance of their current research focus and the direction their future work should take to align with industry needs.

I would like to extend my sincere thanks to Prof. Niranjan Rajapakse for his invaluable guidance and support as the co-coordinator of the event, and his efforts in planning, organizing, and ensuring the smooth execution of the event were truly appreciated. I am also deeply grateful to Prof. Anoma Chandrasekara, President IFSTSL for her unwavering assistance in organizing this event. The support from the Executive Committee members and the members of IFSTSL was invaluable in making this event a success.

It was a pleasure to witness multidisciplinary research under the food science stream from both state and private universities and research institutes gathered in one forum. I extend my appreciation to all the presenters and authors for sharing their work with us.

I hope this research session will expand to an international level in the coming years and wish FoodTechno a continued success.

Dr. Sumudu Warnakulasuriya
Co-Coordinator/FoodTechno 2024

Abstracts of the Research Presentations FoodTechno 2024
Eighth Annual Research Session of the IFSTSL

(05th October 2024 at Renuka City Hotel, Colombo 03, from 8.30 a.m. to 4.00 p.m.)

TABLE OF CONTENTS

	Page No.
Research Session I (Oral Presentations)	
1. Development of meat analogue using oyster mushrooms and enrichment with rice bran protein: extraction and characterization <i><u>Sandareka M.K.</u> and Perera O.D.A.N</i>	2
2. Development of instant pudding mix using <i>Pentadesma butyracea</i> (African butternut) seed cake and evaluation of bioactivity and shelf life <i><u>Nishadhi R. R.</u>, Binduhewa A.M.C.U., Samarasinghe U.K.A., Liyanaarachchi G.D., Vasantharuba S. and Kathirgamanathar</i>	3
3. Awareness and compliance with food safety and quality legislation among Sri Lankan youth: a cross-sectional study <i><u>Samarasinghe S.A.I.I.</u> and Buddhapriya A.N.</i>	4
4. Detection of synthetic food colorants in confectioneries available in Gampaha district, Sri Lanka <i><u>Dilrukshi S.H.B.</u> and Somapala E.G.</i>	5
Research Session II (Oral Presentations)	
5. Development of grain-based meat analogue and analysis of sensorial and physical properties <i>Kariyawasam K.P., <u>Wickramaarachchi L.A.</u> and Herath H.M.T.</i>	6
6. Enhancement of quality attributes of selected local cereals and pulses to develop a milk substitute <i><u>Wijewardane R.M.N.A.</u> and Wijesinghe K.D.B.V.</i>	7
7. Melamine detection in milk using green synthesized silver nanoparticles from red flowers of <i>Hibiscus rosa-sinensis</i> <i><u>Hussain Z.</u>, Kandiah M., Gunaratne B. and Perera O.</i>	8
8. Extraction, characterization and stability analysis of a marine-derived bacterial crude biopigment to be used as a natural food colouring agent <i><u>Peiris P.H.A.</u>, Aththanayake A.M.K.C.B., Priyadarshani W.M.D., Rajapakse M. and Udalamaththa A.V.L.K.</i>	9

9. Process optimization to extract essential oil and oleoresin from the different grades of cinnamon [*Cinnamomum zeylanicum* Blume] bark and screening of antioxidant activity, and essential oil composition
Madhawa J.K.R., Rajapakse R.P.N.P., Mendis B.E.P. and Harischandra T. 10

Poster Presentations

10. Development and optimization of a method using uv-vis spectrophotometry for the quantitative analysis of monosodium glutamate to be applied in food samples
Rathnayake R.M.C.U., Somapala E.G., Senevirathne D. and Ambepitiya I.J. 12
11. Development of pasta supplemented with Villard mango pulp and canistel fruit powder
Danoshya N. and Thanuja S. 13
12. Analysing tea quality parameters, including caffeine content, polyphenol content and pesticide residues in commercially available tea samples from the Sri Lankan market
Rathnayake R.M.K.T., Jayasuriya C.K. and Premachandra J.K. 14
13. Brined green peppercorn (*Piper nigrum*) as a functional product for the export market
Jayathilake H.U., Senarath H.P.S. and Chamara S. 15
14. Detection of red flour beetle (*Tribolium castaneum*) life cycle stages in wheat flour using a modified sieving technique
Danthanarayana V.S. and Jayathunga J.W.A.U.Y. 16
15. Determination of phenolic content, antioxidant and sensory quality of selected flower tea infusions
Bandara J.M.S.P., Mendis B.E.P. and Rajapakse R.P.N.P. 17
16. A comparative nutritional analysis of chickpea based and wheat flour based meat analogue formulations
Kariyawasam K.P., Wickramaarachchi L.A. and Herath H.M.T. 18
17. Effect of potassium sorbate on the survivability and functionality of yoghurt culture
Ramasinghe R.C.M., Rajawardhana D.U., Mendis B.E.P., Rajapakse R.P.N.P. and Chasna M.R.P. 19
18. Study on market acceptability of locally available processed fruit and vegetable products in three districts of Sri Lanka
Ekanayaka E.M.G.S., Perera O.D.A.N. and Warnakulasuriya S.N. 20

19.	Development of <i>Pentadesma butyracea</i> (African butternut) fruit sauce and determination of antioxidant activities <u>Wasala W.M.D.D.</u> , Binduhewa A.M.C.U., Weerasooriya C.J., Liyanaarachchi G.D., Vasantharuba S. and Kathirgamanathar S.	21
20.	Comparative analysis of sensory attributes, nutritional quality, and shelf life of vegan and chicken patties <u>Prabhashi Gavindhaya P.H.G.</u> and Nayomi H.M.D.	22
21.	The perception of foreign tourists on street foods in Aluth Kade - West, Galle Face, and Hikkaduwa <u>Dissanayake D.M.S.S.</u> and Nayomi H.M.D	23
22.	Development of bio-based edible film <u>Perera W.N.K.Y.</u> and Nayomi H.M.D.	24
23.	Rice bran protein as an egg white substitute on textural improvement of pound cake <u>Jayarathne J.R.B.G.</u> and Jayasinghe C.V.L.	25

**Research Sessions I & II
(Oral Presentations)**

DEVELOPMENT OF MEAT ANALOGUE USING OYSTER MUSHROOMS AND ENRICHMENT WITH RICE BRAN PROTEIN: EXTRACTION AND CHARACTERIZATION

Sandareka M.K.^{1*} and Perera O.D.A.N.¹

¹*Department of Food Science & Technology, Faculty of Livestock, Fisheries & Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila NWP, Sri Lanka*

Corresponding author : kasunisandareka38@gmail.com*

Rice (*Oryza sativa L*) bran is an underutilized milling by-product of rough rice. Nowadays, a huge amount of rice bran has been discarded and used as animal feed. It is an inexpensive source of protein. The objectives of this research were to extract protein from rice bran, to analyze the physiochemical and functional properties of rice bran protein concentrates (RBPCs), to incorporate rice bran protein into a meat analog made from oyster mushrooms, and to evaluate final product quality. In this research, three commonly consumed Sri Lankan rice varieties (Bw 358, Bg 368, and At 313) were used. The protein content of RBPCs ranged between 49.0 ± 0.70 % to 53.9 ± 0.87 %. At 313 resulted highest protein content compared to the other two varieties. The water absorption capacity of RBPCs ranged between 1.33 ± 0.11 to 1.59 ± 0.32 (g/g) while oil absorption capacity was in the range between 1.04 ± 0.20 to 1.54 ± 0.00 (g/g). They had considerable water absorption capacity, especially for Bw 358, and Ld 368 exhibited the highest oil absorption capacity. Furthermore, the secondary structure of the protein was determined using Fourier Transform Infrared Spectroscopy (FTIR). Some of the functional groups were identified using FTIR spectra. Then mushroom nugget was developed using rice bran protein concentrates and textured soy proteins in this research. Four types of mushroom nuggets; Control mushroom nuggets (CMNs), RBPCs included mushroom nuggets (RMN1s with 5 % RBPCs, RMN2 with 10 % RBPCs, and RMN3 with 15 % RBPCs) were prepared. Then quantitative descriptive sensory evaluation was conducted to gauge consumer acceptance and preferences with the participation of 30 untrained panelists. The 5 % RBPCs incorporated nugget was the most preferable nugget among all combinations. Furthermore proximate composition, water activity, pH, textural properties, color measurements and microbial quality were determined of accepted mushroom nugget from sensory evaluation. Based on proximate analysis, developed mushroom nugget has shown 10.8 % of protein content and relatively low fat content of 3.6 % contributes to the overall lower calorie content compared to other protein sources like meat. The findings of this study contribute to the development of plant-based protein-enriched products, offering a sustainable and nutritious alternative for consumers seeking innovative and environmentally conscious food options.

Keywords: FTIR, meat alternatives, secondary structure, soy protein, mushroom nuggets

DEVELOPMENT OF INSTANT PUDDING MIX USING *Pentadesma butyracea* (AFRICAN BUTTERNUT) SEED CAKE AND EVALUATION OF BIOACTIVITY AND SHELF LIFE

Nishadhi R.R.², Binduhewa A.M.C.U.¹, Samarasinghe U.K.A.¹, Liyanaarachchi G.D.¹,
Vasantharuba S.² and Kathirgamanathar S.^{1*}

¹Industrial Technology Institute, 503 A, Halbarawa Gardens, Thaladena, Malabe, Sri Lanka

²Department of Agricultural Chemistry, Faculty of Agriculture, University of Jaffna, Ariviyal
Nagar, Kilinochchi 44000, Sri Lanka

Corresponding author*: selvaluxmy@iti.lk

The African butternut tree, *Pentadesma butyracea*, is growing in National Botanical Garden in Peradeniya, Sri Lanka, produces edible fruits. The seeds are used to extract butter (30-50 %) and the remaining seed cake is not utilized. One tree yields \approx 200 kg of fruits during season and due to unawareness of this tree so far limited products have been developed from butter and fruit pulp on a lab scale. This research aimed to analyze the proximate composition and antioxidant activity of the seed cake powder, which remains waste after fat extraction, to prepare instant pudding mix. Three formulations of instant pudding mix were made using 5 % seed cake powder, sugar, citric acid, and natural spice flavour as same and three different ratios of carrageenan: corn flour (formula -1, 5:30; formula -2, 10:25; and formula -3, 15:20). The 3 formulations were subjected to sensory evaluation by the trained sensory panel of ITI, collected data, analyzed according to rank sum analysis and formula 1 was significantly preferred ($p < 0.05$) better than formulas 2 and 3. Microbiological quality parameters (aerobic plate count, yeast and mold count and total coliforms) and physicochemical parameters [colour, firmness, pH and total soluble solids (TSS)] were evaluated for pudding mix. The proximate composition and antioxidant assay DPPH were conducted on the seed cake powder and selected instant pudding mix but FRAP and ORAC were evaluated for seed cake powder only. The pudding made had the colour (L-37.96 \pm 0.99, b-4.57 \pm 0.105 and a-10.04 \pm 0.23), pH (5.6 at 28 °C), firmness (0.57 \pm 0.03 N) and TSS (16 °Brix). The product was acceptable in terms of microbiological, physicochemical, and sensory quality up to two weeks of storage at 26 \pm 2 °C. According to the proximate analysis, seed cake powder and pudding mix had moisture, 5.28 \pm 0.04 % and 5.05 \pm 0.02 %; protein, 3.44 \pm 0.13 % and 0.46 \pm 0.11 %; fat, 29.84 \pm 0.36 % and 1.74 \pm 0.07 %; and total ash, 2.59 \pm 0.02 % and 0.40 \pm 0.01 % respectively. Total Phenolic Content (TPC) of seed cake powder and pudding mix was 14.42 \pm 1.714 mg Gallic acid equivalent (GAE)/g and 118.34 \pm 7.45 mg GAE/g, respectively. Total Flavonoid Content (TFC) of seed cake powder was 7.96 \pm 0.12 mg Quercetin equivalent/g; however, it was not detected in pudding mix. ORAC and FRAP values for seed cake powder were 71.53 \pm 2.17 mg Trolox equivalent (TE)/g and 31.04 \pm 2.78 mg TE/g, respectively. The DPPH radical scavenging activity of seed cake powder and pudding mix were 1.69 \pm 0.05 mg TE/g and 0.25 \pm 0.02 mg TE/g, respectively. This instant pudding mix can offer health benefits due to its high antioxidants creating a good market potential.

Keywords: antioxidants, proximate, formulations, seed cake, pudding mix

AWARENESS AND COMPLIANCE WITH FOOD SAFETY AND QUALITY LEGISLATION AMONG SRI LANKAN YOUTH: A CROSS-SECTIONAL STUDY

Samarasinghe S.A.I.I.¹ and Buddhapriya A.N.^{1*}

¹*Faculty of Science, Horizon Campus, Sri Lanka*

Corresponding author : arosha@horizoncampus.edu.lk*

The rapid expansion of Sri Lanka's food industry presents substantial opportunities for economic growth, yet it also necessitates strict adherence to legal regulations governing food safety and quality. This study aims to assess the awareness, attitudes, and compliance with food safety legislation among Sri Lankan youth, a demographic critical to shaping the future of the nation's food standards. The objective is to identify gaps in knowledge and practices related to food safety, with a focus on improving compliance with national regulations. A cross-sectional survey was conducted among 125 participants aged 18-30, who completed an online questionnaire designed to capture their awareness of food safety standards, factors influencing their food choices, and their trust in regulatory bodies. The survey employed both qualitative and quantitative methods to analyse the data. Results indicated that while 42.9 % of participants had a good understanding of food safety regulations and the roles of national agencies, 32.7 % had limited knowledge, and 8.2 % possessed minimal awareness. Notably, 10.2 % of respondents were unaware of the "Food Act No. 26 of 1980". Key factors influencing food choices included taste (83.7%), price (79.6 %), brand name (73.5 %), and health safety (59.2 %). Despite 12.2 % of participants reporting health issues related to food consumption, only 16.7 % sought assistance from regulatory bodies. The findings underscore the urgent need for targeted educational initiatives to enhance youth awareness and compliance with food safety laws. Strengthening collaboration between regulatory bodies, educational institutions, and industry stakeholders is crucial to fostering public trust and ensuring the safety and quality of food in Sri Lanka.

Keywords: economic growth, educational initiatives, health safety, national regulations, public trust, regulatory bodies

DETECTION OF SYNTHETIC FOOD COLORANTS IN CONFECTIONERIES AVAILABLE IN GAMPAHA DISTRICT, SRI LANKA

Dilrukshi S.H.B.^{1*} and Somapala E.G.¹

¹*Department of Chemistry, University of Colombo, Sri Lanka*

Corresponding author : buddhi.dilrukshi@gmail.com*

Food colorants are the key component in colored food items that are used to enhance consumer attraction and consumer's acceptability. Most of the sugar confectioneries are colored confectioneries to attract the consumers mainly children because the visual aspect plays an important role in the selection of food products. Food manufacturers commonly use synthetic colors as color additives and substitutes for natural colors due to some specific properties of synthetic colors such as more stability, adding no flavor, being less expensive and blending more easily. Regular consumption of permitted synthetic colorants and higher usage of non-permitted colorants may cause different health threats mainly among children. Therefore, the main intention of this research study is to identify the permitted & non-permitted synthetic food color adulteration in confectioneries available in the Gampaha district, Sri Lanka. A total of 92 colored confectionery samples of seven food categories were randomly collected from small and medium scale vendors and supermarkets in the Gampaha district. The samples were prepared & color was extracted. The extracted color was analyzed using thin layer chromatography (TLC) and UV visible spectrophotometric method with synthetic food color standards, which are permitted in Sri Lanka according to the Food Act and its regulations. The results of this study revealed that 97 % of samples contained synthetic permitted food colorant and only 3 % of samples did not contain any colorant. Tartrazine (46.73 %) is the most frequently used food colorant in analyzed confectioneries. Subsequently, 23.91 %, 20.65 %, 17.39 %, 15.25 %, 5.43 % and 5.43 % of total samples contained Brilliant blue, Sunset yellow, Erythrosine, Carmoisine, Allura red and Ponceau 4R, respectively. Fast green FCF and Indigo carmine were not detected in any analyzed confectionery samples, and 1 % of samples adulterated with unidentified non-permitted colorants. This qualitative research study concluded that there is a higher usage of synthetic permitted colorants in confectioneries and only 1 % of samples contained non-permitted colorants. Based on this research study, it is crucial to implement strict regulations for food manufacturers & provide awareness programs for consumers.

Keywords: confectionery, synthetic food colorant, non-permitted, thin layer chromatography (TLC), UV- Visible spectrophotometer

DEVELOPMENT OF GRAIN-BASED MEAT ANALOGUE AND ANALYSIS OF SENSORIAL AND PHYSICAL PROPERTIES

Kariyawasam K.P.¹, Wickramaarachchi L.A.¹ and Herath H.M.T.^{1*}

¹*Food Technology Section, Modern Research and Development Complex, Industrial Technology Institute, Colombo, Sri Lanka*

Corresponding author : theja@iti.lk*

A meat analogue is a plant-based protein product designed to emulate conventional meat. The growing disparity between the current supply and future demand in meat has intensified the necessity for producing plant-based meat analogues. Present study aims to develop meat analogue formulations, specifically as a substitute for commercially available comminuted meat products and analyze the sensorial and physical properties. Two types of formulations were prepared; chick pea based (30 %) and wheat flour based (30 %) meat analogues using additional ingredients of green gram, cowpea, soy protein isolate, preservatives, binding agents, with condiments imparting spicy flavor in shapes of cubical shapes. The formulations were prepared following soaking, draining, roasting, wet blending, molding and pressure cooking at a pressure of 15 psi for 14 minutes, and vacuum sealing. The sensorial evaluation with trained panel was carried out on vacuum packed product for the parameters of appearance, color, odor and tenderness while after stir-frying of the same product, texture, taste, juiciness, fattiness and overall acceptance were considered. Physical parameters of water activity (a_w), pH, color, water holding capacity and oil holding capacity were conducted. The sensory analysis results showed no significant difference ($p>0.05$) between the vacuum-packed and stir-fried versions of both the wheat-based and chickpea-based analogues. Physical parameters results for the wheat based analogue were as followed: water activity (a_w) 0.96 ± 0.00 (25.6 °C), pH 5.90 ± 0.10 (25.6 °C), color (L = 44.02 ± 1.40 ; a = 11.81 ± 0.22 ; b = 30.50 ± 0.81), water holding capacity 99.20 ± 0.54 , and oil holding capacity 141.61 ± 4.72 . For the chickpea based analogue the results were: water activity (a_w) color (L = 45.39 ± 0.99 ; a = 7.53 ± 0.38 ; b = 23.78 ± 0.42), water holding capacity 140.38 ± 16.50 , and oil holding capacity 180.85 ± 23.60 . A significant difference ($p<0.05$) between the two meat analogues was observed in water holding capacity and oil holding capacity. In conclusion, present study highlights the potential of wheat- and chickpea-based meat analogues as viable substitutes for traditional comminuted meat products, demonstrating improved sensory qualities while revealing notable differences in water and oil holding capacities, which are critical for their future application and consumer acceptance.

Keywords: comminuted, conventional, plant-based, substitute, meat analogue

ENHANCEMENT OF QUALITY ATTRIBUTES OF SELECTED LOCAL CEREALS AND PULSES TO DEVELOP A MILK SUBSTITUTE

Wijewardane R.M.N.A.* and Wijesinghe K.D.B.V

National Institute of Postharvest Management, Jayanthi Mawatha, Anuradhapura, Sri Lanka

Corresponding author: nianthiwijewardana@yahoo.com*

Sri Lanka's current domestic production of milk is only about 40% of the demand, and the country is significantly dependent on milk imports, primarily in the form of powdered milk, to fulfill this demand gap. The study was conducted to develop an alternative supplementary food using local cereals, pulses and evaluation of the physicochemical, nutritional and microbial quality of the developed product. Soybean (*Glycine max*), green gram (*Vigna radiate*), finger millet (*Eleusine coracana* L.), and suwandel rice (*Oryza sativa*) were selected as local cereals and pulses, and oats (*Avena sativa*) was used to improve the consistency of the final product. The experiment was conducted to evaluate the physico-chemical properties of the grain flour and tested for the effect of pre-treatment procedures such as malting and general milling process to enhance flour properties. Pre-treated grains were milled and checked for proximate composition, i.e., moisture content, crude protein and crude ash content and the functional properties, i.e., bulk density, tapped density, particle density, particle porosity, flowability, cohesiveness, wettability, hygroscopicity and insolubility index. The results obtained were analyzed using SPSS statistical package and mean separations were done using Least Significant Difference. The results revealed that there was no significant difference ($\alpha = 0.05$) in proximate compositions between the two pre-treatments and the highest crude protein % (0.04 ± 0.003) and high ash % (3.8 ± 0.017) were recorded by soy bean and green gram respectively. High bulk density (0.83 ± 0.004 g/cm³), particle porosity % (0.68 ± 0.01), and hygroscopicity % (3.77 ± 0.006) were recorded in suwandal rice, oats and finger millets respectively. The flour of selected cereal and pulses, prepared by malting and the general process will be subjected to formulation of milk substitute in the second phase of the experiment.

Key words: milk substitute, grain, malting, functional properties, proximate composition

**MELAMINE DETECTION IN MILK USING GREEN
SYNTHESIZED SILVER NANOPARTICLES FROM RED FLOWERS OF
*Hibiscus rosa-sinesis***

Hussain, Z.¹, Kandiah, M.^{1*} Gunaratne, B.¹ and Perera, O.¹

¹*School of Science, BMS, 591, Galle Road, Colombo 06, Sri Lanka*

Corresponding author : mathi@bms.ac.lk*

Food safety refers to critical public health concerns from contaminated foods and causing foodborne illness. From farm to table, the food supply chain is vulnerable to chemical hazards, microbiological contamination, and poor cleanliness. Resolving these challenges is essential to ensure public health and safety. Melamine is a chemical rich in nitrogen that is added to dairy products to artificially infiltrate the protein levels. Melamine adulteration is a serious food safety issue since consumption can cause serious renal failure, kidney stones and other diseases. The approved limit for melamine is 2.5 parts per million (ppm) in food products. This research was conducted to perform colorimetric detection of melamine using silver nanoparticles (AgNPs) which is found to be a highly selective and sensitive compared to conventional approaches. Red *Hibiscus rosa-sinesis* AgNPs (Red_AgNP) was synthesized at room temperature for 24 hours. The presence was confirmed by spectrometric readings which showed a peak at 440 nm. Next, melamine detection using AgNP was performed. A solution of 800 μ L of Red_AgNP and 600 μ L of melamine (2 ppm and 8 ppm) was prepared. The absorbance was recorded from 320 nm to 720 nm. The results showed 440 nm AgNP peak and a new peak at 640 nm confirming the presence of melamine. Next, melamine adulteration in milk was performed. Initially, whey protein was obtained from the fresh milk sample by heating at 90 °C, cooling at 60 °C, addition of 0.2 M citric acid, centrifugation, and filtration. A mixture of 600 μ L of whey solution, 600 μ L of melamine and 800 μ L of Red_AgNP was prepared along with a mixture of 600 μ L of whey solution and 800 μ L of Red_AgNP. Absorbance was recorded from 320 nm to 720 nm. The results showed the melamine peak at 680 nm confirming melamine adulteration in milk. From this study, it can be concluded that Red_AgNP can serve as a potential melamine detector using the colorimetric method.

Keywords: green synthesis, silver nanoparticles, *Hibiscus rosa-sinesis*, melamine, milk

EXTRACTION, CHARACTERIZATION AND STABILITY ANALYSIS OF A MARINE-DERIVED BACTERIAL CRUDE BIOPIGMENT TO BE USED AS A NATURAL FOOD COLOURING AGENT

Peiris P.H.A.¹, Aththanayake A.M.K.C.B.², Priyadarshani W.M.D.¹, Rajapakse M.¹ and Udalamaththa A.V.L.K.^{2*}

¹Department of Biosystems and Biotechnology, Faculty of Science, Sri Lanka Technology Campus, Sri Lanka

²Department of Life Sciences, Spectrum Institute of Science and Technology, Sri Lanka
Corresponding author*: vindya@spectrumcampus.edu.lk

Colour is a prominent factor in the overall appeal of food products to consumers. To preserve the colour in food that may degrade due to storage or processing, synthetic food colourants are often used. However, while effective in maintaining product appearance, synthetic food colourants have raised significant concerns due to their potential health and environmental risks. To address these issues, marine-derived bacterial biopigments emerge as promising alternatives to synthetic food colourants. Therefore, the present study aimed to investigate the probability of incorporating marine bacterial crude biopigments as a food colouring agent. In this study, a yellow-pigmented marine bacterium, identified as *Micrococcus* sp. through morphological and biochemical assays, was isolated from surface marine water samples collected from Fish Pier, Sri Lanka (6.87813° N, 79.855846° E). The intracellular crude pigment was extracted using ultrasound-assisted, 99 % (v/v) ethyl alcohol extraction. UV-visible spectroscopic analysis in the visible light region (350-700 nm) confirmed the presence of carotenoids in the extracted pigment. The stability of the extracted pigment in light conditions at its *Artemia salina* lethality concentration (50 %) in 2 % (w/v) sucrose solution (LC₅₀ = 19 mg/mL) was assessed under varying pH (3.5, 5.5, 7.5) and temperatures (4 °C, 30 °C, 40 °C) typical of food processing and storage environments, by the change in absorbance at λ_{\max} in the visible light region at 24 hour intervals for 48 hours. This demonstrated a gradual decrease in stability with increasing time and temperature, and as well as with decreasing pH and increasing time albeit Levene's test and Kruskal-Wallis rank sum test, conducted using RStudio version 4.3.2 revealing no significant differences ($p > 0.05$). The findings of this study suggests that the ethanolic extract of the crude pigment of *Micrococcus* sp., holds promise as a natural food colourant, promoting further exploration for their integration into food products.

Keywords: bacteria, biopigments, food colourants, stability

**PROCESS OPTIMIZATION TO EXTRACT ESSENTIAL OIL AND OLEORESIN FROM
THE DIFFERENT GRADES OF CINNAMON
[*Cinnamomum zeylanicum* Blume] BARK AND SCREENING OF ANTIOXIDANT
ACTIVITY, AND ESSENTIAL OIL COMPOSITION**

Madhawa J.K.R.^{1*}, Rajapakse R.P.N.P.¹, Mendis B.E.P.¹ and Harischandra T.²

¹Department of Food Science and Technology, University of Peradeniya, Sri Lanka

²Stay Natural Pvt Ltd Matale, Sri Lanka

Corresponding author*: ravindumadhawa96@gmail.com

Sri Lankan cinnamon, also known as true cinnamon (*Cinnamomum zeylanicum* Blume), is known to be the best cinnamon in the world. It is becoming a component of healthy food. This study was conducted to optimize the hydro-distillation extraction process of essential oil and solvent extraction process of oleoresin from the nine grades of true cinnamon bark mentioned in the Department of Cinnamon Development. The residue part of the grading process, commercially known as BP-Boosy grade yielded the highest sieved percentage (95.39±0.29 %), making it the most viable grade for large-scale processing. The highest essential oil yield of the BP-Boosy (1.38±0.01 ml/g) was achieved at 100 °C and 4 h of extraction. While H2 (2.36±0.18 %), H3 (2.30±0.07 %), and Special (2.36±0.12 %) grades exhibited the highest oil contents. Moreover, the BP-Boosy (1.36±0.03 %) grade was the most strategic choice due to its lower raw material cost among all the grades. The highest cinnamaldehyde content was observed in H3 (72.31±0.30 %), C5 (65.38±0.42 %), and H1 (67.57±0.36 %) grades respectively. The highest eugenol content (5.27±0.02 %) was in the H3 grade and the highest linalool content (2.63±0.002 %) was in the BP-Boosy grade. The C5-Special grade had the highest cinnamyl acetate content (3.37±0.02 %). In addition, the BP-Boosy grade had the highest DPPH radical scavenging activity (3.53±0.01 TE mg/g) among H3 and BP-Boosy. This study recognized BP-Boosy grade as the most profitable and strategically sound option for the large-scale production of essential oil, due to its high oleoresin yield, lower production cost, availability, and favorable chemical profile.

Keywords: *Cinnamomum zeylanicum* Blume, essential oil, oleoresin, cinnamaldehyde, eugenol

Poster Presentations

DEVELOPMENT AND OPTIMIZATION OF A METHOD USING UV-VIS SPECTROPHOTOMETRY FOR THE QUANTITATIVE ANALYSIS OF MONOSODIUM GLUTAMATE TO BE APPLIED IN FOOD SAMPLES

Rathnayake R.M.C.U.¹, Somapala E.G.^{1*}, Senevirathne D.² and Ambepitiya I.J.²

¹*Institute of Chemistry Ceylon, College of Chemical Sciences, Rajagiriya, Sri Lanka*

²*Government Analyst's Department, Battaramulla, Sri Lanka*

Corresponding author: somapala@yahoo.com*

Monosodium glutamate (MSG) is a flavour enhancer used in savoury snacks and many other food preparations and permitted to be used according to the Food (Flavouring Substances and Flavour Enhancers) Regulations 2013. Accurate detection and control of MSG levels are essential for ensuring consumer safety, particularly in products where flavor enhancers are restricted. MSG forms blue-coloured complexes with Cu²⁺ ions, enabling MSG to be detected by measuring the absorbance of visible light in the 400–700 nm range. This study aimed to develop and optimize a quantitative measurement of MSG using UV-Visible spectrophotometry. A Cu²⁺ concentration of 0.05 M was added to varying concentrations of glutamic acid (0.01 M – 0.075 M), mixed with a pH 10 phosphate buffer. A wavelength scan was performed including a blank sample, and the maximum absorption wavelength (λ_{\max}) was observed at 690 nm. A calibration curve was plotted at that λ_{\max} . The linear regression equation was $y = 6.82442x + 0.00000$, with a regression coefficient (R^2) of 0.99389. The results showed a precision of 5.97 %, 0.67 %, and 0.63 % for lower, medium, and upper levels, respectively. The percentage recoveries were 94.13 % (0.075 M-highest level), 81.75 % (0.04 M-mid level), and 31.00 % (0.01 M-lower level). A decreased signal-to-noise ratio at lower levels, along with sample preparation errors, may have contributed to the lower recovery. This method demonstrated efficacy in detecting higher MSG levels. The proposed modifications, such as optimizing reagent concentrations and calibration ranges, could improve recovery for low MSG levels, broadening its application for stringent food safety monitoring. This enhanced method holds the potential to impact industry practices by offering a cost-effective and reliable approach to ensure regulatory compliance and consumer protection.

Keywords: monosodium glutamate, UV-Vis spectrophotometry, quantitative analysis, good manufacturing practices, method validation, maximum absorption wavelength

DEVELOPMENT OF PASTA SUPPLEMENTED WITH VILLARD MANGO PULP AND CANISTEL FRUIT POWDER

Danoshya N.^{1*} and Thanuja S.¹

¹*Department of Food Technology, University College of Jaffna, University of Vocational Technology, Jaffna 40000, Sri Lanka*

Corresponding author : danoshyadanu117@gmail.com*

Fruits and fruit-based foods, offer a rich arrangement of textures, flavors and health benefits. Especially mango and canistel are low-calorie fruit rich in vitamins A, C and E, antioxidants and phenolic compounds. They support heart health, and improve vision, skin, and hair. Mangoes aid in blood vessel formation and collagen production, while canistel promotes liver and kidney health, lowers cholesterol, and has anti-cancer benefits. Incorporating mango pulp and canistel powder into pasta are innovative products. To date, no studies have explored this combination. The aim of this study was to develop pasta with locally available, carotenoid-rich yellow fruits namely mango pulp and canistel powder to enhance the nutritional value, flavor and color of the pasta. Pasta was prepared by different ratio of semolina flour and mango pulp. Same amount of canistel powder was added into that. Sensory attributes and nutritional properties of pasta were evaluated. A 5 point hedonic scale was used for sensory testing, with attributes such as appearance, color, taste, odor, stickiness, texture, mouthfeel, and overall acceptance were evaluated by 30 semi trained panelists. Results revealed that among all the formulations tried, pasta supplemented with semolina flour, mango and canistel in the ratio of 80:15:5 was chosen as the best by panelists. The overall acceptability of pasta was significantly different ($p < 0.05$) from others. Nutritional analysis of selected pasta from the sensory evaluation confirmed that 77.554 % of carbohydrate, 8.21 % of protein, 7.86 % of moisture, 1.77 % of fat, 4.43 % of ash and 0.164 % of fibre. Supplementation of yellow fruits into pasta will be the best technique to provide natural vibrant yellow color, new flavor combination and contribute sustainability in waste reduction and local, seasonal ingredients.

Keywords: health benefits, nutritional value, pasta, sustainability, yellow fruits

ANALYSING TEA QUALITY PARAMETERS, INCLUDING CAFFEINE CONTENT, POLYPHENOL CONTENT AND PESTICIDE RESIDUES IN COMMERCIALY AVAILABLE TEA SAMPLES FROM THE SRI LANKAN MARKET

Rathnayake R.M.K.T.^{1*}, Jayasuriya C.K.¹ and Premachandra J.K.²

¹*Department of Chemistry, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka*

²*Department of Chemical and Processing Engineering, Faculty of Engineering, University of Moratuwa, Moratuwa, Sri Lanka*

Corresponding author : rmktrathnayake@gmail.com*

Tea quality analysis is an essential step to guarantee that tea products comply with stringent standards and fulfil consumer expectations. This study aimed to determine whether standard tea quality parameters are met, including the assessment of polyphenols levels, caffeine content and the pesticide residues in 10 tea samples collected from the Sri Lankan open market. Moisture content, total ash content, water soluble ash content in total ash, alkalinity of water-soluble ash, acid insoluble ash content, amount of water extract, crude fibre content and polyphenol content are the tea quality parameters that were assessed by following ISO testing methods. Nine tea samples exhibited moisture content levels between 3 % and 7 % by mass, with only one sample showing a moisture content of 9.23 % by mass. Among the samples tested for ash content, only one sample did not fall within the ISO required range of 4-8 % by mass on dry basis, with a value of 3.9 % by mass on dry basis. All tea samples were in agreement with the ISO requirement for water-soluble ash, comprising a minimum of 45 % by mass of total ash content. In terms of acid-insoluble ash content, which should not exceed 1 % by mass on dry basis according to ISO standards, only one sample recorded a value of 1.17 % by mass on dry basis. Regarding the alkalinity of water-soluble ash (1-3 % by mass on dry basis), water extract (minimum 32 % by mass on dry basis), and crude fiber content (maximum 16.5 % by mass on dry basis), all the samples were compliant with ISO standards. Considering the polyphenol content, 8 out of the 10 samples were exceed the minimum value (9 % by mass on dry basis) which is required to comply with ISO standards. Caffeine content was analysed by ISO 10727:2002 using HPLC coupled with Diode Array Detector. In tea samples, caffeine content was detected in the range of 1.8-2.4 % by mass on dry basis. Pesticide residues were analysed by EN 15662:2018 method using Liquid Chromatography system coupled with Tandem Mass Spectrometer (LC-MSMS) with respect to 246 pesticides. Eight out of ten tea samples showed the presence of pesticide residues at ppm level. Accordingly, it can be concluded that eight out of ten tea samples which taken from Sri Lankan open market do not comply with ISO standards for tea quality parameters; moisture content, ash content, acid-insoluble ash content, polyphenol content and the presence of pesticide residues.

Keywords: tea, tea quality parameters, caffeine content, pesticide residues, polyphenol content

BRINED GREEN PEPPERCORN (*Piper nigrum*) AS A FUNCTIONAL PRODUCT FOR THE EXPORT MARKET

Jayathilake H.U.^{1*}, Senarath H.P.S.¹ and Chamara S.²

¹*Department of Food Science & Technology, Faculty of Livestock, Fisheries & Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila, Sri Lanka*

²*People's Organisation for Development Import & Export, 33/3, Kadirana North, Demanhandiya, Sri Lanka*

Corresponding author : uvindij@gmail.com*

Sri Lanka is the 12th largest exporter of pepper globally and faces tough competition from countries that have advantages in labor, land, and resources. This study focuses on the production of value-added spice products, specifically immature green peppercorns, which have seen with a growing demand. The peppercorns were pickled in a brine solution using sea salt and citric acid and allowed to ferment for four weeks. The pH changes of the brined pepper were measured regularly to determine the point at which it becomes shelf-stable (pH below 4.5) and a portion of the sample was pasteurised for 2 minutes to stop the fermentation. The pasteurised peppercorn was tested 1-week after production to ensure fermentation had properly halted and the microbial count remained shelf-stable. A comparative analysis of the functional, chemical, sensory, and microbial properties of brined peppercorns and fresh berries was conducted. The flavonoids and phenolic contents in brined green pepper were significantly ($p < 0.05$) higher than in fresh berries, indicating comparatively higher antioxidant content in the former. The 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging capacities were higher in brined samples. A salt content of 8.2 ± 0.4 g/100 g of brined peppercorn was calculated using Mohr's test. Sensory evaluation using a 7-point hedonic scale showed a significantly high ($p < 0.05$) overall acceptability of the brined peppercorn, both pasteurised and non-pasteurised. Ninety-two percent of participants showed interest in buying this product as an alternative to other pickle varieties. Accelerated shelf-life determination estimated a shelf life of 91 ± 1.2 days for brined peppercorns at room temperature determined by the values of yeast and mould count compared to fresh berries which last two weeks. The cost analysis revealed that a 350 g pickled peppercorn bottle could be priced at Rs.830 \pm 10, positioning it favourably against cucumber and olive pickles. These findings highlight the market potential for brined green peppercorn to emerge as a valuable functional spice product.

Keywords: antioxidants, brining, export market, peppercorn

DETECTION OF RED FLOUR BEETLE (*Tribolium castaneum*) LIFE CYCLE STAGES IN WHEAT FLOUR USING A MODIFIED SIEVING TECHNIQUE

Danthanarayana V.S.^{1*} and Jayathunga J.W.A.U.Y.²

^{1,2} Department of Food Science and Technology, University of Sri Jayewardenepura, Sri Lanka
Corresponding author*: vishwasan1996@gmail.com

The presence of insect infestation in wheat flour presents significant food safety risks and economic concerns for the food industry. Rapid and accurate detection of insect eggs is critical in preventing contamination and ensuring product quality. Traditional methods often rely on chemical staining; however, this study investigates a modified sieving technique by adapting the AOAC Official Method 940.34. A fresh wheat flour sample, 75 % extraction level and stored under controlled conditions (22 °C, 45 -55 % RH), was then artificially infested with 10 adult red flour beetles (*Tribolium castaneum*) over a two-week breeding period. A 50 g flour sample was sieved using a 150 microns (0.150 mm) sieve, and the residue was subjected to acid digestion. The resulting solution was filtered, stained with iodine, and examined under a compound microscope. This adaptation of the standard AOAC method enabled the identification of red flour beetle eggs as microscopic, white oval spheres. The slender larvae appeared creamy yellow to light brown, with two dark pointed projections on the last body segment, while the pupae were white to yellowish. Unlike staining methods that differentiate between eggs and flour particles, this modified sieving technique isolates potential egg-containing residue for microscopic examination. Although this study provides preliminary evidence for the feasibility of the modified sieving technique, further research is needed to assess its sensitivity, specificity, and efficiency compared to existing methods. This approach holds promise for developing a rapid, cost-effective, and non-toxic tool for insect egg detection in wheat flour.

Keywords: red flour beetle, insect eggs, larvae, pupae, sieving, insect detection

DETERMINATION OF PHENOLIC CONTENT, ANTIOXIDANT AND SENSORY QUALITY OF SELECTED FLOWER TEA INFUSIONS

Bandara J.M.S.P.^{1*}, Mendis B.E.P.¹ and Rajapakse R.P.N.P.¹

¹*Department of Food Science and Technology, Faculty of Agriculture, University of Peradeniya, Sri Lanka*

Corresponding author : subodyapuanmthi@gmail.com*

Herbal infusion teas prepared by soaking herbs with tea in a liquid are popular among health-conscious consumers and are a trend in the global tea market. Previous research has reported that these herbal tea infusions possess various health-promoting and disease-preventing properties. This study aims to evaluate the phenolic content, antioxidant, and sensory quality of flower tea infusions employing *Jasminum officinale* L. (Jasmine), *Hibiscus sinensis* L. (Hibiscus), *Nyctanthes arbor-tristis* L. (Night Jasmine), *Melastoma malabathricum* L. (*Bowitiya*), *Clitoria ternatea* L. (Blue Butterfly pea), *Nelumbo nucifera Gaertn* (Red Lotus), *Sesbania grandiflora* (Sesbania), *Musa spp.* (Banana), and *Rosa rubiinosa* (Rose) which are underutilized flowers used in Ayurvedic medicine in Sri Lanka. The total phenolic and flavonoid content was analyzed using spectrophotometric methods. Antioxidant activity was assessed using the DPPH radical scavenging and ferric-reducing antioxidant power assays. A consumer panel with thirty-five panelists ranked the sensory quality using the attributes of taste, aroma, color, and overall acceptability of flower only = 2:0, Flower: Black Tea = 1: 1, Flower: Black Tea = 0.5: 1.5, Flower: Green Tea = 1: 1, Flower: Green Tea = 0.5: 1.5 product formulations, indicating their preference. The results of this study indicate significant variation in phenolic content, flavonoid content and antioxidant activities among selected flower tea infusions. *Melastoma malabathricum* L. (*Bowitiya*) flower possesses the highest phenolic content (21.184 ± 0.229 mg GAE/g), flavonoid content (280444 ± 18954^a μ g CE/g) as well as DPPH radical scavenging activity (4240.5 ± 310 μ g TE/g) and Ferric Reducing Antioxidant Power (40762 ± 29071^a μ g AE/g) compared to that of other flowers. When the tea is mixed with flowers, the phenolic content of both tea and flowers contributes to antioxidant activity and thus increases. The most preferred flower tea infusion formulation in any flower was either Flower: Black Tea 0.5:1.5 or Flower: Green Tea 0.5:1.5. Based on the results, while all the selected underutilized flowers have considerable potential for developing new flower tea infusion products, *Bowitiya* stands out as the best choice. Further research is warranted to perform toxicity analysis and clinical trials before introducing these flower tea infusions to the market.

Keywords: antioxidant activity, bioactive compounds, *Melastoma malabathricum* L., flower tea infusion, underutilized flowers

A COMPARATIVE NUTRITIONAL ANALYSIS OF CHICK PEA BASED AND WHEAT FLOUR BASED MEAT ANALOGUE FORMULATIONS

Kariyawasam K.P.¹, Wickramaarachchi L.A.¹ and Herath H.M.T.^{1*}

¹Food Technology Section, Modern Research and Development Complex, Industrial Technology Institute, Colombo, Sri Lanka

Corresponding author*: theja@iti.lk

A meat analogue is a plant-based protein product crafted to closely mimic the taste and nutrients of conventional meat, offering a nutritious alternative. As the gap widens between the current meat supply and the future demand and further a growing trend toward the vegan segments, the importance of developing nutrient-rich plant-based meat analogues has become increasingly crucial. The present study examines the compositional and nutritional analysis of formulations of wheat based analogue and chickpea-based analogue. The compositional analysis of the prepared precooked meat analogues was conducted to determine moisture content, crude fat, crude fiber, crude protein, ash content and carbohydrate levels, in accordance with standard methods. *In-vitro* digestibility of meat analogues was conducted to determine the available protein content. The mineral content of the formulations was analyzed by techniques of microwave digestion followed by metal detection via Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The results of proximate compositional analysis of protein, fat, moisture, ash, fiber and carbohydrate content for the wheat based analogue and chickpea based analogue were (13.17±0.24; 15.74±0.99), (4.84±1.68; 5.38±1.12), (43.62±0.11; 43.40±0.20), (3.11±0.01; 3.37±0.01), (3.49±0.25; 4.83±0.16) and (31.78±1.13; 27.28±1.88) respectively. The *in-vitro* availability of protein for the wheat-based analogue and chickpea-based analogue were 44.55 % and 67.32 %, respectively, based on the initial total protein content of the formulas. The mineral content of products showed the following results for the wheat-based analogue: Fe; 17.9±0.85 mg/kg, Na; 0.45±0.06 %, Mg; 438±44.24 mg/kg, Ca; 471±11.72 mg/kg, and P; 0.32±0.03 mg/kg. The chickpea-based analogue contained, Fe; 24.8±1.55 mg/kg, Na; 0.42±0.07 %, Mg; 504±8.19 mg/kg, Ca; 554±8.19 mg/kg, and P; 0.35±0.06 %. Zn contents were not detected in both samples. In conclusion, the study demonstrates that both wheat-based and chickpea-based meat analogues offer valuable nutritional profiles, thereby highlighting their potential as sustainable protein sources for the growing global protein demand.

Keywords: alternative, mimic, nutrient-rich, potential, sustainable, meat analogue

EFFECT OF POTASSIUM SORBATE ON THE SURVIVABILITY AND FUNCTIONALITY OF YOGHURT CULTURE

Ramasinghe R.C.M.¹, Rajawardhana D.U.^{2*}, Mendis B.E.P.¹, Rajapakse R.P.N.P.¹ and Chasna M.R.P.²

¹*Department of Food Science and Technology, Faculty of Agriculture, University of Peradeniya, Sri Lanka*

²*Food Technology Section, Modern Research and Development Complex, Industrial Technology Institute, Colombo, Sri Lanka*

Corresponding author: upeka2005iti@gmail.com*

Yoghurt, a widely consumed food, is produced through the synergistic action of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus*. Sri Lanka Standards Institution has permitted the addition of potassium sorbate (up to 300 ppm) to yoghurts that are flavored or thermized, which ensures the extension of the shelf life and effective control of yeast and molds. Yet, the addition of potassium sorbate has become a controversial issue where some studies suggest potassium sorbate has a negative impact on the yoghurt starter culture viability and others indicate no significant impact. This research investigates the possible influence of potassium sorbate on yoghurt culture added to flavored yoghurts, specifically addressing compliance with Sri Lanka standards where the minimum requirement of starter culture viability at the end of the shelf life is 10⁷ CFU/g. An in-depth analysis of eight established market yoghurt samples at expiration of shelf life revealed that all complied with the minimum required viable starter culture count, with sorbate levels between 200-300 ppm. However, a significant negative relationship (p<0.05) between added sorbate amount and viable starter culture count was observed, highlighting the potential adverse impact of potassium sorbate on yoghurt starter culture. No statistically significant relationship (p>0.05) was detected between pH, titratable acidity, and the presence of added sorbate in these market samples. Based on the results, it can be concluded that, when higher level of potassium sorbate is added, to ensure the minimum requirement of starter culture viability, the inoculum size should be increased correspondingly. This research provides valuable insights into the compliance of yoghurt manufactured with SLS while highlighting the potential negative impact of adding potassium sorbate.

Keywords: potassium sorbate, yoghurt culture, Sri Lanka standards, pH, titratable acidity

STUDY ON MARKET ACCEPTABILITY OF LOCALLY AVAILABLE PROCESSED FRUIT AND VEGETABLE PRODUCTS IN THREE DISTRICTS OF SRI LANKA

Ekanayaka E.M.G.S.^{1*}, Perera O.D.A.N.¹ and Warnakulasuriya S.N.²

¹*Department of Food Science and Technology, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila NWP, Sri Lanka;*

²*Science and Technology Business Center, Industrial Technology Institute, 363, Bauddhaloka Mawatha, Colombo 7, Sri Lanka*

Corresponding author : gimhanisathsarani37@gmail.com*

Processing fruits and vegetables is essential for food preservation, extending shelf life, reducing post-harvest losses, and enhancing food availability. This research aimed to study current consumer demand through market and consumer surveys through understanding consumer preferences, purchasing behaviors and overall satisfaction. Market acceptability of processed fruit and vegetable products was explored through in-person interviews with staff members of 52 marketplaces and online questionnaires provided to 278 consumers in the Colombo, Kandy, and Kurunegala districts of Sri Lanka. The market survey assessed sales quantities of processed fruit and vegetable products, while the consumer survey evaluated the frequency of usage of these products. The results revealed significant demand variations across different age groups, geographical areas, and income levels. For processed fruit products, there was a significant difference in demand across age groups ($p = 0.001$) and geographical areas ($p = 0.00$), as the p -value was less than 0.05. For processed vegetable products, a significant difference was observed across different areas ($p = 0.002$). The study found that price, product quality, and nutritional value were the key factors consumers considered when purchasing processed fruit and vegetable products. The mean level of consumer satisfaction with the quality of processed fruit and vegetable products available in the market (2.71 ± 0.84) fell between "agree" and "neither agree nor disagree." According to the analysis of mean values for consumer preferences and product sales quantities, the most preferred fruit products were fruit juice, jam, and minimally processed fruits. For vegetable products, the most favored were minimally processed vegetables, sauces, and soup mix powders. The findings of this research provide valuable information about consumer preferences for processed fruit and vegetable products, which will be beneficial for future marketing strategies and product development in the processed food industry in Sri Lanka.

Keywords: consumer preferences, market demand, processed food industry

DEVELOPMENT OF *PENTADESMA BUTYRACEA* (AFRICAN BUTTERNUT) FRUIT SAUCE AND DETERMINATION OF ANTIOXIDANT ACTIVITIES

Wasala W.M.D.D.², Binduhewa A.M.C.U.¹, Weerasooriya C.J.¹, Liyanaarachchi G.D.¹,
Vasantharuba S.² and Kathirgamanathar S.^{1*}

¹Industrial Technology Institute, 503 A, Halbarawa Gardens, Thaladena, Malabe, Sri Lanka

²Department of Agricultural Chemistry, Faculty of Agriculture, University of Jaffna, Ariviyal
Nagar, Kilinochchi 44000, Sri Lanka

Corresponding author*: selvaluxmy@iti.lk

Pentadesma butyracea is an oil yielding plant named as an African butternut tree. It is growing in Hunuwala Estate and National Botanical Gardens, Peradeniya, Sri Lanka. The seeds and fruits are highly nutritious and due to the unawareness of this plant in Sri Lanka, very few products have been developed on a lab scale. This study aimed to develop viable food products on an industrial scale. The fresh fruits were collected from the Hunuwala Estate, and the fruit pulp was used to make *Pentadesma* fruit sauce. The sauce was made using *P. butyracea* fruit pulp, sugar, salt, spices, ginger, vinegar, chilli powder, and a permitted preservative. Nutritional value and antioxidant activities were evaluated for both fruit pulp and fruit sauce and physicochemical parameters analyzed only for sauce. Antioxidants (total phenolic content-TPC; total flavonoid content-TFC) and antioxidant activities using different mechanisms (DPPH, ORAC and FRAP) were evaluated using the water extracts of the fruit pulp and sauce. Sensory evaluation was carried out by a trained sensory panel in Industrial Technology Institute (ITI) and the data analyzed according to rank sum analysis based on critical difference at α 0.05. The *Pentadesma* fruit sauce was accepted by the screened and trained sensory panel of ITI. The *Pentadesma* sauce resulted in pH (2.14 at 27 °C), moisture (71.4 ± 0.1 %), TSS (28 °Brix), water activity (0.96 ± 0.001), viscosity (3823 ± 32.53 cP at 26.4 °C), colour (L=32.16 ± 0.16; a=12.27 ± 0.13; b=18.08 ± 0.19) and titratable acidity (2.11 ± 0.01 %). The sauce contains protein (0.34 ± 0.001 %), ash (0.86 ± 0.002 %), fat (0.25 ± 0.01 %), fiber (3.9 ± 0.02 %) and carbohydrates (27.15 ± 0.03 %). The TPC and TFC of the fruit pulp were 1.79 ± 0.08 mg gallic acid equivalent (GAE)/g of pulp and 0.23 ± 0.01 mg quercetin equivalent (QE)/g of pulp. The DPPH, ORAC and FRAP were 1.03 ± 0.02 mg Trolox equivalent (TE)/g of pulp, 3.05 ± 0.88 mg TE/g of pulp and 2.43 ± 0.23 mg TE/g of pulp. The TPC and TFC value of sauce were 2.59 ± 0.01 mg GAE/g of sauce and 0.29 ± 0.004 mg QE/g of sauce. The DPPH value was 0.66 ± 0.06 mg TE/g of sauce. The product was stable for up to three weeks of storage (on-going study) at 26 ± 2 °C. This study suggests that *Pentadesma* fruit pulp could be used to develop nutritional and value-added fruit products as new products in the market.

Keywords: fruit sauce, quality parameters, antioxidants

COMPARATIVE ANALYSIS OF SENSORY ATTRIBUTES, NUTRITIONAL QUALITY, AND SHELF LIFE OF VEGAN AND CHICKEN PATTIES

Prabhashi Gavindhaya P.H.G.¹ and Nayomi H.M.D.^{1*}

¹*Faculty of Science, Horizon Campus, Malabe, Sri Lanka*

Corresponding author : danushika@horizoncampus.edu.lk*

The global demand for protein is rising due to population growth, necessitating sustainable protein sources. This study investigated the sensory attributes, protein content, and microbiological stability of vegan and chicken patties, with a focus on consumer preferences and shelf life. Vegan burger patties were prepared by boiling young green jackfruit and American oyster mushrooms, mincing them, and mixing with seasonings and wheat flour, with both types divided into grilled and air-fried sets. Chicken burger patties were made by blending chicken breast with eggs, breadcrumbs, and spices, and similarly divided for grilling and air-frying. Sensory evaluations revealed a preference for grilled animal-based patties, emphasizing the need for further refinement of plant-based alternatives. Proximate analysis indicated that chicken patties had a higher protein content (23 %) than vegan patties (5 %). Additionally, the study found variations in pH and moisture content between the two types of patties over six weeks. Chicken patties exhibited a significant pH range (6.1–5.5) compared to vegan patties (5.7–4.5), likely due to differences in protein composition and processing methods. Additionally, moisture content was different in chicken patties (76.50 ± 5 %) and vegan patties (71.50 ± 5 %), this was not a statistically significant difference, suggesting a similar impact on texture and juiciness. The microbial analysis conducted under refrigeration (-4 °C) revealed no growth in the first three weeks for both parties, but significant increases in microbial counts were noted by the fourth week, with vegan patties reaching 3.3×10^6 CFU/ml and chicken patties 5.4×10^6 CFU/ml. This growth continued into the fifth week, reaching 1.04×10^7 CFU/ml and 1.23×10^7 CFU/ml respectively, leading to overgrowth by the sixth week, indicating progressive spoilage and contamination. Overall, this study provides valuable insights into developing sustainable plant-based protein alternatives that are both nutritious and appealing to consumers.

Keywords: plant-based protein, sensory attributes, nutritional quality, shelf-life analysis

THE PERCEPTION OF FOREIGN TOURISTS ON STREET FOODS IN ALUTH KADE - WEST, GALLE FACE, AND HIKKADUWA

Dissanayake D.M.S.S¹ and Nayomi H.M.D^{1*}

¹*Faculty of Science, Horizon Campus, Malabe, Sri Lanka*

Corresponding author : danushika@horizoncampus.edu.lk*

A bustling segment of Sri Lankan cuisine, street food has substantial obstacles when it comes to hygienic practices and nutrition. Although concerns persist regarding hygiene and nutrient content, Sri Lankan street food retains its popularity among both local residents and foreign visitors due to its affordability and the opportunity to experience authentic ethnic flavors. This study aims to close the empirical data gap on foreign visitors' expectations and understanding regarding the safety and nutritional value of Sri Lankan Street cuisine in Galle Face, Aluth Kade - West, and Hikkaduwa areas in Sri Lanka. The data analysis for the survey conducted using the random sampling method with a sample size of 77 foreign participants. The survey data revealed that more female foreign visitors (58.33 %) are interested in Sri Lankan Street food than male foreign visitors (41.67 %). The age group investigation verified that 40% of young foreign tourists, primarily those between the ages of 18 and 30, consume street food. Consuming street foods were experienced as the food quality met the expectations which was preferred by 52 % from the participants. Moreover, 5% of tourists expressed dissatisfaction with the street food, indicating that the quality generally fell below the expectations. The study evaluates the awareness and preferences of foreign tourists in addition to looking at the nutritional characteristics of a few street delicacies. The research aims to comprehend the factors influencing foreign visitors' consumption of street food and their awareness of its nutritional composition through surveys and interviews with travelers. The results are anticipated to guide initiatives and regulations to raise street food awareness among foreign visitors and strengthen street vendor food safety protocols. This study adds to the larger conversation about nutrition and food safety by providing information that can protect consumer health and promote the long-term expansion of Sri Lanka's street food businesses.

Keywords: Sri Lanka tourism, consumer, hygiene, nutrition, Sri Lankan street food

DEVELOPMENT OF BIO-BASED EDIBLE FILM

Perera W.N.K.Y.¹ and Nayomi H.M.D.^{1*}

¹*Faculty of Science, Horizon Campus, Malabe, Sri Lanka*

Corresponding author : danushika@horizoncampus.edu.lk*

Bio-based biodegradable polymeric materials offer a promising alternative towards a more sustainable solution to conventional plastics used in food packaging. This study investigated the development of an edible film using gelatine, plasticized with glycerol, and incorporating prebiotic fruit sources, apple and watermelon. Gelatine along with glycerol were used to prepare the edible film using the casting method. The prepared edible film was analysed for physico-chemical parameters such as pH, film thickness, film transparency, sensory perception and microbial growth. The edible packaging was evaluated against a control (plain packaging), chocolate-filled packaging, and sugar-filled packaging. The panellists preferred the chocolate-filled edible film over the sugar-filled one. They also suggested improvements to the visual appearance of the edible film. Additionally, the pH of the edible cling film was evaluated for five consecutive days (pH = 6.2 ± 0.5 , 29 °C) with no significant difference. The film exhibited a transparency of 25.1 % which had an impact on consumer preference. The moisture content of the edible packaging was found to be 45.71 %. Yeast and mould counts tested for three consecutive days (Day 1 – too less to count, Day 3 – 4×10^5 CFU/ml) suggest that larger dilutions exhibit increased population densities. Microbial growth reached an uncountable level by the fourth week (week 1 – too less to count, week 4 – 2×10^6 CFU/ml). As indicated by the total plate count, the edible packaging has a shelf life of approximately three weeks. The general pattern of total plate count shows stages of early expansion, adjustment, recuperation, and finally fast multiplication. This study concludes as a preliminary investigation into the development of edible films with nutrient content. Further analyses are required to enhance flavour, transparency and establish microbiological safety of the edible film.

Keywords: edible packaging, gelatine, development, sensory evaluation

RICE BRAN PROTEIN AS AN EGG WHITE SUBSTITUTE ON TEXTURAL IMPROVEMENT OF POUND CAKE

Jayarathne J.R.B.G.^{1*} and Jayasinghe C.V.L.¹

¹*Department of Food Science and Technology, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila (NWP), Sri Lanka*

Corresponding author : jrbgjayarathne@gmail.com*

Rice is the diet of a quarter of the world's population and the global rice production is estimated to reach 52.6 million tons per year by 2027. On average, every kilogram of milled rice produces 0.05 - 0.1 kg of rice bran (RB), which is about 10 % of the rough rice weight. Due to 12-13 % of oil content, RB is an ideal source for oil extraction, hence generating vast amounts of defatted RB. Defatted RB contains high-quality proteins, which account for 15-18 % of its weight and have several benefits, such as higher antioxidant activity and hypoallergenicity. The present study assessed the feasibility of recovering proteins from defatted RB and using them as a substitute for egg whites in the textural improvement of pound cake. RB collected from commercial rice processors was initially assessed for the crude protein content. The protein extraction by the alkaline method was optimized for the pH, temperature, and time using a 3-factor-3-level Box-Behnken design. Fifteen experimental runs with the combinations of pH (9, 10.5, 12), time (60, 90, 120 min), and temperature (25, 45, 65 °C) were used for process optimization avoiding protein denaturation. The extracted protein was then substituted for egg white in pound cake, prepared using egg white instead of whole egg, and compared for the textural properties. RB contained a crude protein content of 14.36 ± 0.33 %, and the extractable protein content ranged from 0.55 ± 0.03 % to 8.91 ± 5.57 % for different parameter combinations. The empirical linear model developed for the effect of pH, temperature, and time on the yield of RB was significant ($P=0.000$), with a high coefficient of determination of 97.03 %. The optimized pH, time, and temperature combination for the maximum yield was pH 12, 120 min, and 65 °C, with a process-optimized yield of 10.96 %. Further, the hardness and chewiness of RB protein substituted pound cake showed no significant difference in the control ($P=0.058$, $P=0.971$). Therefore, the RB protein extraction process with the optimized pH, time, and temperature conditions is highly feasible for the commercial extraction of proteins from the rice industry byproduct of RB, and it can be successfully used as an egg white protein substitute in food product development.

Keywords: rice bran protein, protein extraction, egg white substitute, textural improvement, rice industry byproduct