

Book of Abstracts
International Conference on Food Quality, Safety
and
Security
(FOOD QualSS 2017)

24 – 25, October 2017

Colombo, Sri Lanka

Committee of the FOOD QualSS - 2017

The International Institute of Knowledge Management (TIKM)

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Official website of the conference

www.foodsecurityconference.co

Book of Abstracts of International Conference on Food Quality, Safety and Security
(FOOD QualSS 2017)

Edited by Ms. Udayangani Premarathne, The International Institute of Knowledge
Management, Sri Lanka

ISBN 978-955-4903-87-6

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Published by The International Institute of Knowledge Management (TIIKM), No:
531/18, Kotte Road, Pitakotte ,10100, Sri Lanka

Tel: +94(0) 11 3098521

Fax: +94(0) 11 2873371

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MESSAGE FROM THE HOSTING PARTNER FOOD QualSS 2017

It is with great pleasure I write this congratulatory message to the International Conference on Food Quality, Safety and Security 2017 (FOOD QualSS 2017) to be held from October 24th -25th, 2017 organized by the Department of Food Science and Technology, University of Sri Jayewardenepura in collaboration with the International Institute of Knowledge Management.

The theme of this conference is “Better Life through Sustainable Production of Quality and Safe Foods” and the conference will be a multi-disciplinary assembly with a affluent representation of eminent Academics, Researchers, young Scientists and research students. This conference is also expected to foster stronger research ties between the scientists representing different institutions, countries and regions. Therefore, the FOOD QualSS 2017 will offer a splendid opportunity for the participants to network with other professionals who research on Food Quality, Safety and Security through a multiplicity of perspectives and relevant disciplines.

One of the roles of our National Universities is the creation of intellectual capital. I am pleased to state that our University is already making a big economic contribution through the research and proactively fosters intellectual capital because it ensures a sustainable economic productivity. Much of the research we perform is commissioned by government funding agencies, business and industry through contracts and grants, with economic productivity and social welfare as expressed aims. We also make discoveries and inventions which, formalised in recent years as 'technology transfer', are put directly to work by the public and private sector to generate economic return. In the context of present priorities, the FOOD QualSS 2017 is the right forum for academicians, researchers and experts to come together to share their information and experiences.

While conveying my best wishes for a fruitful conference I exhort you to make every possible to get the maximum benefit the conference.

Prof. Sampath Amaratunge,
Vice-Chancellor and Professor of Business Economics,
University of Sri Jayewardenepura,
Sri Lanka

MESSAGE FROM THE CONFERENCE CHAIR FOOD QualSS 2017

I am pleased to welcome you to the International Conference on Food Quality, Safety and Security 2017 (FOOD QualSS 2017) in Colombo. I bring this message to you with feelings of optimism on the Conference. The FOOD QualSS 2017, on the main, focuses on three key areas; Food Quality, Safety and Security. On the other hand, the Food Quality, Food Safety and Food Security are three prime expectations of the world. Hence, the Conference attempts to align its objectives with those the local and global Food Sector.

Food quality is nothing but the quality characteristics of food that is acceptable to us as consumers. This includes external factors such as appearance, texture and flavour and internal factors such as chemical, physical, microbial qualities. The quality of a food can be influenced by external factors as well. Most importantly, the Nutrition Quality of a Food is our main focus and there are several major factors which lead to nutrient degradation and as such we need to control them. The maintenance of quality of food commodities depends upon the same principles and practices whether the quantities be small, perhaps a few tonnes or national food reserves. As FAO, the Food Safety is a global concern and as WHO points out, the current estimated global burden of foodborne disease from microbiological food safety problem and the related social and economic costs remain unacceptably high. Food security, simply speaking, is the availability of food and one's access to it. A household is considered food-secure when its occupants do not live in hunger or fear of starvation. According to the World Resources Institute, global per capita food production has been increasing substantially for the past several decades. Food availability, food utilization, and food access are the principle variables that define household food security. Food availability, food utilization and food access are the principle variables that define household food security.

The International Conference on Food Quality, Safety and Security 2017 directly and indirectly touches upon many important areas relevant to Food Quality, Food Safety and Food Security. Among them, areas such as Food Quality and Safety per se, Food Nutrition, Food Biotechnology, Food Value Chains, remedies for Post-Harvest Losses, Agro-technology and Agribusiness are worthy noticing.

The Conference is a world class opportunity that brings the professionals, scientists and researchers who are working in different but relevant disciplines to a common forum to share their valuable research findings. The Conference will also provide openings for the national and international researchers/professionals to either initiate new networks or to strengthen the existing partnerships and collaborations thereby to excel in advance research to achieve main goals of Food Quality, Food Safety and Food Security in the respective countries and the globe at large.

I am looking forward to meeting you in Colombo during the FOOD QualSS 2017 and to sharing a most pleasant, interesting and fruitful conference.

Prof. K.K.D.S. Ranaweera

Conference Chair/ FOOD QualSS 2017

Senior Professor and Chair/Department of Food Science and Technology, USJP, Sri Lanka

President/Institute of Food Science and Technology Sri Lanka (IFSTSL)

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KEYNOTE SPEECH

FUTURE RESEARCH DIRECTIONS IN GRAIN PRODUCTION AND QUALITY

H. Corke

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ABSTRACT

First, I will discuss the key developments in grain science over the past few decades in order to set the stage to examine some priorities and prospects for progress in the next 25 years. This is based on an editorial I recently wrote for *Journal of Cereal Science* (Corke, 2017).

Complex computer-controlled machinery already runs many food processing factories. Some farm machinery is precision-guided, and drones collect data to guide fertilization regimes for many farmers' fields. For the future, precision agriculture, depending on big data approaches, will increasingly dominate crop production. Vast improvements in water use and chemical input efficiencies will be gained. Automated farm equipment will become smaller, cheaper, and more diverse. Robots will carry out tasks such as weeding and even pest control.

In the past, ingredient and formulation research and development has been dominated by diet and health products. Low fat, low sugar, low salt, high fiber options are widely available. Gluten-free has become a major food category. Antioxidants and lactic acid bacteria are included in more and more products. The limitations of many of these have become all too apparent abundance and low-cost have often prevailed over quality. Malnutrition from food devoid of calories has been reported. There has been renewed interest in local, craft and artisan products, and a return where affordable to quality raw materials, more traditional cooking, and emphasis on enjoyment. For the future, research on the gut microbiota will dominate nutritional research for the next 25 years. The gut microbiome will be at the center of testing the effects of new foods and formulations, in ways to optimize gut health for individual consumers. There will be greater efforts to understand the objective characteristics of artisan foods or local specialties, such that large-scale production can take place.

The past 25 years have seen periods of worry about global supply of grains (coinciding with rises in energy prices). There is a more recent sense that energy prices and supply are more or less under control, and that abundant grain supplies are technically feasible, albeit at significant environmental costs. The supply chain has become a unifying concept for discussion of food safety issues. ISO 22000 specifically incorporates HACCP into a supply chain context. For the future, Intensive agriculture for grain, meat, and biofuels will be incorporated into a more sustainable framework. Countries will make decisions as to their suitability or otherwise for large-scale agricultural production. Solutions to supply shortage of inputs e.g. phosphates, will be sought. Technologies for management of safety in the supply chain will be further developed, acknowledging that the trend is for food ingredients and products to travel longer and longer average distances. The Chinese Belt and Road Development initiative will be a major impetus for research on supporting technologies for e.g. packaging development and microbiological quality.

Corke, H. (2017). Editorial. *Journal of Cereal Science* July 2017, A1-A2.
<https://doi.org/10.1016/j.jcs.2017.07.015>

ORAL PRESENTATIONS

A1

[01]

**THE EFFECT OF BOILING, STIR-FRYING AND MICROWAVE COOKING
METHODS ON THE ANTIOXIDANT POTENTIAL OF LOCAL BRINJAL
VARIETY (*Solanum melongina*) AVAILABLE IN JAFFNA DISTRICT**

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Sri Lanka*

ABSTRACT

Brinjal (*Solanum melongina*) is a rich source of ascorbic acid and phenolics having good antioxidant properties which belongs to solanaceae family. The peel of brinjal (egg plant) has the highest value of nasunin that belongs to the flavonoids and induces its dark purple colour and the pulp is also rich in polyphenols, particularly in chlorogenic acid, which belongs to the hydroxybenzoic acids. However the antioxidant potential of vegetables is influenced by the cooking methods. The aim of this study was to compare the antioxidant potential in terms of total antioxidant capacity, antioxidant activity, phenolic content and flavonoid content of raw and cooked (boiling at 100°C for 5 min, microwave cooking at 560W for 2 min and stir-frying at 230 °C for 10 min) brinjal. Fresh brinjal cut in to small pieces and subjected to different cooking methods until the brinjal become tender and palatable. Ethanol (70 %) was used as a solvent to extract the phenolics. The highest total phenolic content (14.893±1.843 mg gallic acid equivalent /g dry matter), total antioxidant capacity (64.996 ±1.964 mg ascorbic acid equivalent /g dry matter) and total flavonoid content (13.15± 0.697 mg catechin equivalent /g dry matter) were observed in microwave cooked brinjal compared to boiled (6.05±0.73 mg catechin equivalent /g dry matter), stir-fried (3.2±0.7 mg catechin equivalent /g dry matter) and uncooked brinjal (7.11±0.51 mg catechin equivalent /g dry matter). Boiled and stir-fried brinjal showed significantly lower total phenolic content (7.39 ±0.38 and 6.69 ±0.11 mg gallic acid equivalent /g dry matter respectively) and total antioxidant capacity (25.84±3.3 and 24.29±1.3 mg ascorbic acid equivalent /g dry matter respectively) than others. Microwave cooked and stir fried brinjal showed higher 2, 2-Diphenyl-1- picrylhydrazyl (DPPH) radical scavenging activity with an inhibition concentration 50% (IC₅₀) 0.043 mg/ mL and 0.04 mg/ mL respectively than raw and boiled brinjal. In addition, there was a statistical strong positive correlation (r = 0.897) between total phenolic content and total antioxidant capacity in raw and cooked brinjal. These results showed that microwave cooking of brinjal is the better to preserve or enhance total phenolic content, total flavonoid content and total antioxidant capacity while boiling and stir-frying reduce the antioxidant potential of brinjal.

Keywords: antioxidants, brinjal, flavonoid content, phenolic content, radical scavenging activity

A2

[02]

REVERSAL OF TOXIC EFFECTS IN WISTAR RATS CAUSED BY TARTRAZINE THROUGH ORAL ADMINISTRATION OF MELON SEED OIL

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ABSTRACT

Tartrazine, a synthetic food colorants is being used in many food items to enhance their appealing quality. However, it is under controversy regarding its safety for consumers. Hence, present study was conducted to assess its possible toxic effects and the potential of melon seed oil (MSO) to mitigate these effects in experimental rats. For the purpose, various doses of tartrazine alone and tartrazine with MSO were administered orally to experimental animals for a period of 60 days. The blood samples were collected after scarifying the rats at 20, 40 and 60 days and variations in different hematological and serological parameters were noted. The results depicted that hematological attributes (hemoglobin & hematocrit), serum lipid profile (TC, TGs, LDL & HDL), serum testosterone, SOD and GSH exhibited significantly decreased concentrations under the effect of tartrazine treatments. While liver function tests (AST, ALT, bilirubin), renal function tests (urea, creatinine), cardiac enzymes (LDH, CPK, CKMB), serum proteins (albumin, total protein) and MDA showed higher concentrations in response to various doses of tartrazine. However, doses of tartrazine along with different levels of MSO presented mitigating effect of MSO justifying its potential to lessen down the toxic effects of tartrazine.

Keywords: LDL, TC, TGs, AST, ALT, LDH

RAPID DETERMINATION OF ADULTERATION IN COCONUT OIL USING FT-NIR SPECTROSCOPY

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ABSTRACT

Coconut oil is the main edible oil used and also a major export industry in the country. Due to health benefits and cosmetic applications, coconut oil industry has been expanded in recent years and intentional adulteration by the cheap oil for unscrupulous financial gains is on the rise. Therefore, it is necessary to develop rapid and cost effective analytical techniques to identify such adulterations. Possibility of use of Fourier Transform Near Infrared spectroscopic (FT-NIR) for the application was investigated. Virgin coconut oil (VCO) and copra coconut oil (CCO) were intentionally adulterated with palm olein in the ranges of 1-70% (n=20). FT-NIR spectra were obtained with an Antaris II FT-NIR of thermo Fisher Scientific, in 10000-4000 cm^{-1} range. Quantification of adulteration was done by partial least square (PLS) model using OMNIC software for two adulterated series. Validation was done by leaving one standard out at a time. For VCO and CCO adulteration Regression Coefficient (R^2) and Root Mean Square Error (RMSE) for calibration were 0.9998, 0.4 % and 0.9994, 0.5 % respectively. Validation, R^2 and RMSE of VCO and CCO were 0.9997, 0.5 % and 0.9990, 0.6 % respectively. Discriminant analysis was done for adulterated VCO and pure VCO and a clear separation was resulted in the cooman plot.

As unknown samples VCO and CCO adulterated with palm oil and predicted by respective PLS calibrations. For VCO 3%, 7%, 11%, 17%, 22%, 38% samples were prepared and predicted values are 2.18%, 5.46%, 9.98%, 15.36%, 23.07%, 37.97%. Also for CCO, 3%, 7%, 13%, 16%, 22%, 32% samples, 5.54%, 8.31%, 14.88%, 17.52%, 23.16%, 32.97% predicted values were obtained. The results showed $< \pm 2$ % variation between unknown value and calculated value except 3% CCO adulteration. The FT-NIR method developed could be used to detect adulteration of coconut and virgin coconut oils with other oils.

Keywords: virgin coconut oil, copra coconut oil, FT-NIR

A4

[04]

A STUDY ON AWARENESS OF CONSUMERS ABOUT FOOD SAFETY OF DAIRY PRODUCTS IN CENTRAL PROVINCE, SRI LANKA

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ABSTRACT

The present study was carried out to assess the current status of the consumer awareness and knowledge on the safety of dairy products in the Central Province of Sri Lanka. Matale, Nuwara Eliya and Kandy districts were selected representing their urban, rural and estate sectors to collect data. A sample of 1000 individuals with fair representation of gender based on the population density of each district was selected. Structured questionnaires were used to collect data from respondents via personal interview. SPSS statistical software and Microsoft office Excel were used to analyze the data. Results showed that awareness on the date of expiry and the date of manufacture was 87% and 94% of the entire population respectively. Seventy one percent of the population was aware of certifications hold by the dairy products. SLS was the highest concerned certification among the consumers from the Central province (62%). Twenty six percent of the consumers were concerned about ISO 22000 while the 11% were aware of the HACCP certification. Safety of the food packaging was considered important by 98% while 89% was concerned about the manufacturer of dairy products. Storage and handling conditions of the dairy products were considered important by 84% and 72% respectively. However, 11% of the population has got sick due to consumption of dairy products and abdominal pain (10%), vomiting (3%), diarrhea (2.5%), headache (2%) and dizziness (1%) were the most frequent health issues that have occurred.

Keywords: awareness, central province, dairy products, health, safety

A5

[05]

ISOLATION OF BACTERIOPHAGE/S FROM STARTER CULTURES OF YOGHURT IN MILCO DAIRY FACTORY AND FORMULATION OF A PHAGE RESISTANT STATER CULTURE

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ABSTRACT

Yoghurt is the best known of all cultured-milk products, and the most popular almost all over the world. For the manufacturing of yoghurt, bacterial cultures known as starters are used. MILCO is a leading dairy company in Sri Lanka and Yoghurt is their most targeted product. Bacteriophage attacks during the production causes loss of entire batches of yoghurt resulting in economic losses to the company. Culture bacteria in starter cultures (DVS) were isolated using Elikar medium and those *Streptococcus thermophilus* and *Lactobacillus bulgaricus* colonies were differentiated using their morphological characters. Bacteriophage/s was isolated from affected yoghurt using M-17 liquid, semi solid and solid culture media and that isolated bacteriophage attacked for *Lactobacillus bulgaricus* but not in *Streptococcus thermophilus*. After further confirmation of phage attack using the setting delay of yoghurt, starter cultures which used in MILCO Company were tested to find out resistant and susceptible strains. Hence by using resistant strains of *Lactobacillus bulgaricus*, a new starter culture was prepared. By using that starter culture, yoghurt samples were prepared with different concentrations of culture bacteria in 1:1 ratio. Each yoghurt sample was tested for setting time, rate of acidity increase and pH decrease to investigate suitable amounts of culture bacteria which have to be mixed and the best amount was 1.5 ml from each culture bacteria at 10^7 CFU/ ml per 80ml of milk. Its average period of setting was 4 hr 10 min and in just after the incubation there was 0.64 of acidity and 5.02 of pH and it received highest score for all sensory parameters (smell, appearance, texture and overall acceptability) in sensory evaluation.

Keywords: Elikar medium, M-17 medium, *Lactobacillus bulgaricus*, *Streptococcus thermophilus*, sensory evaluation

A6

[06]

QUALITY DETERIORATION OF LIPIDS AND MUSCLE OF GAMMA IRRADIATED TILAPIA FISH FILLETS DURING STORAGE IN ICE

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ABSTRACT

Food irradiation is a method of meat, poultry and fish preservation has a potential to improve its quality and extend the shelf life. Therefore the present study was carried out to identify quality deterioration of gamma irradiated tilapia fish fillets. Two different doses of gamma irradiation (1 kGy and 3 kGy) were applied while preserving at 0 ± 1 °C. The quality changes were observed for 77 days storage period at 7 days' time intervals by measuring Peroxide value (PV), Thiobarbituric acid value (TBA), Free fatty acid value (FFA) and Total bacterial count (TPC). PV was maximize at 28 days in non-irradiated and 3 kGy irradiated tilapia and at 14 days in 1 kGy irradiated fillets. TBA value showed highest at 21, 28 and 35 days in non-irradiated, 1 kGy and 3 kGy irradiated fillets respectively (0.014, 0.038 and 0.012 mg MDA/meat kg). At 56 days non-irradiated tilapia showed maximum FFA value (20.735%) while 27.829% FFA at 77 days and 23.992% at 70 days in 1 kGy and 3 kGy irradiated fillets respectively. The TPC was increased with the progress of storage period. Within 7 days non-irradiated fillets exceeded unaccepted level (2.82×10^6 cfu g⁻¹), 1 kGy irradiated fillets took 56 days (1.08×10^6 cfug⁻¹) and 3 kGy irradiated tilapia exceeded level at 70 days (1.21×10^6 cfu g⁻¹) in TPC. The results revealed that gamma irradiation increase the microbial quality while degrade the lipid deterioration of the tilapia fillets.

Keywords: gamma irradiation, microbial, peroxide, Thiobarbituric, FFA

A7

[07]

REFORMULATION OF DIASURE DIABETIC™ (DIABETIC SPECIFIC DIETARY SUPPLEMENT BY ASTRON LIMITED) TO UPGRADE ORGANOLEPTIC AND NUTRITIONAL PROPERTIES

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ABSTRACT

Diabetes is rapidly emerging as a pandemic. Therefore, dietary supplement for diabetes mellitus patients aims at controlling (postprandial) plasma glucose concentrations. Its constituent sources specifically associated with improved glycemic control. The objective of this study was to reformulate DIASURE diabetic™, a dietary supplement for diabetes mellitus, in order upgrade nutritional and organoleptic properties thereby improve the consumer preference towards the product. Different medical guidelines were referred for the determination of Nutritional requirements of the diabetes mellitus patients. Raw materials with low GI, low GL, sucrose-free, lactose-free and high in dietary fiber were selected to incorporate in the formula. Final formula was determined through a number of different sensory analyzes and Kruskal-Wallis non parametric test method was performed to analyze the data obtained from sensory evaluation. Microbiological quality was determined by using SLSI standards and USP standards. Shelf life testing was carried for both microbiological properties and organoleptic properties. Nutritional composition of the finalized formula was determined using AOAC methods thereby energetic value was determined. Eventually, Glycemic index of the product was determined in vivo. Thus glycemic load was calculated. Final preferable formula contains Soy protein isolate, Sodium casienate ,Oligo fructose ,Maltodextrin, Vegetable fat powder, Fructose, Butterscotch Flavor, Vanilla Flavor ,Carboxy Methyl Cellulose ,Calcium Carbonate ,L-cartine tartarate ,Alpha lipoic acid, Taurine ,Inositol, Acesulfame potassium, Vitamins and Minerals. The nutrient composition per 100g of dietary supplement is carbohydrate 49.61g, Total fat 14.9g, Crude protein 21.1g, Crude fiber 0.21g, dietary fiber 6g ,Total ash 4.81 and moisture 3.58g.Energetic value of the product is 416.9 Kcal per 100g of sample. Glycemic index value of the sample is 25±10 (Low GI).Glycemic Load is 4.2±1.7 (Low GL)

Keywords: diabetes, nutritional properties, organoleptic properties, glycemic index, glycemic load

A8

[08]

OPTIMISATION OF EXTRACTION PARAMETERS FOR PHENOLIC CONTENT IN BANANA (*Musa sp.*) PEELS

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ABSTRACT

Banana peels are unused by-product and form about 18-35% of the whole fruit. With a great advantage of exploiting banana peels as a source of valuable compound, this study was carried out to optimise the extraction condition for phenolic content from four varieties of banana (*Musa sp.*) peels using response surface methodology (RSM). The varieties are including *Pisang Berangan*, *Pisang Nangka*, *Pisang Rasthali*, and *Pisang Tanduk*. A single factor of central composite rotatable design (CCRD) was applied to determine the effect of extraction temperature (°C) and extraction time (min) on total phenolic content (TPC) from the unripe banana peels. Based on the results, the optimum condition of extraction for *Pisang Berangan* is 66.30 °C for 80.33 minutes, *Pisang Nangka* is 65.80 °C for 74.36 minutes, *Pisang Rasthali* is 55.49 °C for 75.08 minutes, and *Pisang Tanduk* is 58.37 °C for 79.27 minutes and the total phenolic content (TPC) obtained were 1098.08 mg GAE/100 g DW, 1305.02 mg GAE/100 g DW, 1042.76 mg GAE/100 g DW, and 3573.13 mg GAE/100 g DW respectively. The results also showed that TPC was significantly influenced by both factor studied.

Keyword: banana peels, Total Phenolic Content (TPC), extraction parameters, Response Surface Methodology (RSM)

**PROFILING OF CARBONYL COMPOUNDS IN STORED SOYBEAN SPROUT BY
COMPREHENSIVE MASS-SPECTROMETRIC ANALYSIS FOR
IDENTIFICATION OF FRESHNESS MAKERS**

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ABSTRACT

The objective of this study was to discover a freshness marker of fruits and vegetables from small reactive carbonyl compound which is well known as a second product of lipid peroxidation. Self-cultivated soybean sprout was used as a sample material, and was stored at 5 °C, 10 °C and 20 °C. Soybean sprout was sampled periodically, and was divided into cotyledon and hypocotyl. At the same time, the respiratory CO₂ production was also measured by a flow-through method using a gas chromatography. The carbonyl compounds were extracted from each part by homogenizing with methanol containing 0.05 % of BHT and chloroform. Then, they were derivatized with dansyl hydrazine, which selectively reacts with carbonyl group. High performance liquid chromatography/electrospray ionization tandem mass spectrometry (HPLC/ESI-MS/MS) with multiplexed multiple reactions monitoring (MRM) was used for the comprehensive detection of carbonyl compounds. More than 500 peaks derived from carbonyl compound were observed in MRM chromatogram from both cotyledon and hypocotyl part of stored soybean sprouts. Several *m/z* values were selected as candidates of the freshness maker of soybean sprout by means of principle component analysis-discriminant analysis (PCA-DA) and partial least square-discriminant analysis (PLS-DA) by relating with the accumulation CO₂ production as a reference freshness indicator. The structure elucidation of these freshness marker candidates will be conducted in future study.

Keywords: carbonyl compound, comprehensive mass-spectrometric analysis, freshness assessment, soybean sprout

A10

[10]

**POTENTIAL OF CONTINUOUS PRESSURE TREATMENT IN THE
PRESERVATION OF ASCORBIC ACID IN FRESH-CUT BROCCOLI FLORETS**

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ABSTRACT

The effect of continuous pressure treatment on the ascorbic acid (AsA) of fresh-cut broccoli florets was examined. The fresh-cut broccoli florets were stored in the pressure vessel set at 0.2 and 2 MPa of pressurized air conditions at 8 °C for 14 d. The florets stored under 0 MPa were used as a control. The AsA content and the activity of antioxidant enzymes including ascorbate peroxidase (APX), catalase (CAT), and superoxide dismutase (SOD) were measured before and after storage. The O₂ and CO₂ partial pressure change in the pressure vessel were also determined. The AsA content of the sample stored under both pressurized conditions for 14 d was approximately 2 times higher than that of control. The activities of APX, SOD, and CAT in florets stored under 2 MPa were suppressed, whereas, those in the florets stored under 0.2 MPa were activated. The respiration was slowed down by storing under the pressurized condition. Therefore, the continuous pressure treatment could be used to preserve the AsA content of fresh-cut broccoli florets during storage, which was due to the slowing down metabolic activities. However, the mechanism of the retention of AsA would be different depending on the pressure applied.

Keywords: continuous pressure treatment, ascorbic acid, respiration, fresh-cut broccoli florets

A11

[11]

**TRANS FAT FORMATION AND CHANGES IN FATTY ACID PROFILE OF SOY
AND COCONUT OIL BLENDS WITH REPEATED FRYING**

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ABSTRACT

Frying is very popular food preparation method. Reusing deep fried oil repeatedly for frying becomes a common practice today. During frying free fatty acids, polar molecules, *trans fat* are formed and absorbed into fried food and become a part of human diet. *Trans fat* is known as a critical compound formed during frying. When consider global cooking oil consumption, soy oil obtains a high global demand. Being soy oil rich in unsaturated fat, it is highly susceptible for *trans fat* formation during frying. Blending soy oil with coconut oil increases the stability against isomerization while improving the keeping quality of soy oil. The present study was performed to study the behaviour in fatty acid profile in soy and coconut oil blends over repeated frying. Five oil samples were prepared by contributing 100% soy oil, 75% soy oil with 25% coconut oil, 50% soy oil with 50% coconut oil, 25% soy oil with 75% coconut oil and 100% coconut oil. Potato slices (200 g) were continually deep fried in 200 ml of oil for 30 minutes at 180^oC. All oil combinations went through three repeated frying cycles with 5hr cooling interval. Fatty acid composition was analysed by Gas Chromatography. The obtained results revealed that blending oils modified the fatty acid composition and the blending soy oil with coconut oil 1:3 ratio demonstrated the most suitable blend to minimize detrimental *trans fat* formation during repeated frying.

Keywords: frying, soy oil, blending, coconut oil, *trans fat*

A12

[12]

RETROSPECTIVE ANALYSIS OF FOOD POISONING OUTBREAKS IN SRI LANKA

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ABSTRACT

Outbreaks occurring through contaminated food can adversely affect the health of the population in a country. Many countries systematically review outbreaks to develop strategies to prevent food borne illnesses. Present study was carried out to analyze data on foodborne outbreaks from 2012 to 2015, reported to Medical research institute to evaluate the present situation of food poisoning outbreaks in Sri Lanka. The objectives of the present study were analyzing the laboratory data related to food borne outbreaks and identifying the common food borne pathogens from the samples sent from the food borne outbreaks during 2013-2015. Retrospective analysis was carried out from PHI request forms, laboratory work sheets and laboratory results. Out of total 54 incidents reported, 21 (39%) outbreaks were reported in 2012, 13 (24%) in 2013, 11 (20%) in 2014 and 9 (17%) in 2015. Highest number of outbreaks have been reported from Colombo district (20.3%), followed by Gampaha (18.5%), Kurunagala (9.2%) and Batticaloa (9.2%) respectively. Out of all the sectors, nearly one third of outbreaks were reported from school sector. Considerable number of outbreaks were associated with industrial zones (22.2%) and military establishments (7.4%). 61 food items (41.7%) out of total 146 tested were 'unsatisfactory' and not suitable for human consumption. Further 13 were positive with potentially hazardous pathogens. Out of 13 samples with potentially hazardous pathogens, 12 food items were "rice and curry" and one was a chicken curry. Cooked rice and curry was the major food item brought in to be tested from outbreaks and 90% of them were identified as microbiologically unsatisfactory. Several gaps were identified in existing procedure of food samples sending from foodborne outbreaks to the laboratory. Inadequate information about outbreaks in the request forms sent by PHIs, non-availability of implicated food for testing by the time an authorized person attends the outbreak and unsuitable samples for processing due to improper packaging such as leaking were some of the gaps identified during the study period. Continuous microbiological surveillance of food, training of food handlers, regular training and education of authorized offices, awareness programmes on food borne outbreaks to the public will help to reduce food borne outbreaks and to collect more evidence based scientific data. Food borne pathogens *Salmonella* sp., *Bacillus cereus* and *Staphylococcus aureus* were isolated from these outbreaks over years 2012 to 2015.

Keywords: food poisoning outbreaks, food pathogens, *Bacillus cereus*, *Staphylococcus aureus*, *Salmonella* sp

B1

[13]

EFFECTS OF ADDITION OF BARLEY HUSK ON RHEOLOGICAL, TEXTURAL AND SENSORY CHARACTERISTICS OF CHAPATTI

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ABSTRACT

The present study proposed a method to utilize a waste product rich in fiber during isolation of starch from barley grains. Due to growing interest in making fiber rich food products these days, the study aimed to utilize barley husk in chapatti which is considered a staple food of Pakistan and is consumed usually three times a day. Thus, incorporation of barley husk in chapatti would lead to increase in the intake of fiber. The barley husk was added at (5-30)% level into all-purpose wheat flour. The flour was then studied for its rheological, compositional, textural and sensory characteristics. It was observed that gluten content both wet and dry decreased with the increase in barley fiber whereas increase was observed in damaged starch and ash content as fiber itself is a source of ash and damaged starch. The mixing tolerance index increased which suggested weakening of gluten network with the increase in fiber content. The rheological characterization showed that storage modulus was found to be higher than loss modulus for all flours with and without fiber. And the storage and loss moduli at higher frequencies came closer to each other with the progressive rise in fiber content. Alveograph results demonstrated decline in elasticity of dough. The doughs with lower elasticity resulted in formation of harder chapattis. Interestingly, the sensory panelists were unable to perceive differences in chapattis made with increasing quantity of fiber.

Keywords: barley, chapatti, waste utilization, rheology

B2

[14]

STUDYING ANTIMICROBIAL AND ANTIOXIDANT PROPERTIES OF SELECTED PLANT EXTRACTS FOR FOOD PRESERVATIVE APPLICATIONS

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ABSTRACT

Due to the concerns on processed food products, the consumer demands are increasingly focusing on with less use of synthetic additives and at the same time without compromising food safety. Although synthetic antimicrobials are approved in many countries, the recent trend has been for use of natural preservatives due to the adverse health effect of synthetic ones. Natural products, such as plant extract, either as pure compounds or as standardized extracts, provide unlimited opportunities as they can enhance the overall quality of food by decreasing lipid oxidation and microbial growth due to the presence of bioactive compounds. In the present study, an attempt has been made to evaluate several plant extracts such as onion (*Allium cepa* L.), guava (*Psidium guajava*), garlic (*Allium sativum*), papaya (*Carica papaya*), tea (*Camellia sinensis*), Baen (*Avicennia alba*), Keora (*Sonneratia apetala*) for their antimicrobial and antioxidant properties. The air-dried plant materials of the respective plant species were subjected to methanol extraction, concentrated and stored at 4 °C before use. The extracts were dissolved in 95% ethanol for analysis of antioxidant and antimicrobial properties. Of the extracts tested, tea showed the highest zone of inhibition against several pathogenic bacteria while other extracts showed varying levels of zone of inhibition. In regard to DPPH free radical scavenging assay, keora and guava extracts showed the highest 50% inhibition co-efficient (IC₅₀) values of 89.64± 0.18 and 89.39± 0.88 µg/mL, respectively, which are in agreement with higher total antioxidant capacity (TAC) of these extracts. The remaining extracts also showed moderate levels of IC₅₀ values and could be ranked as tea (32.58± 3.18µg/mL)>, papaya (16.60± 0.35µg/mL)>, onion (12.36± 1.77µg/mL) >, garlic (10.74± 0.18µg/mL) >, Baen (9.61± 0.71µg/mL) and varying levels of TAC values in the order of onion, garlic, papaya, tea and Baen. The initial results indicate that the extracts could be used for food preservative applications utilizing both antimicrobial and antioxidant properties. However, efficacy, stability and safety issues need to be addressed with both in vitro and in vivo studies.

Keywords: DPPH, plant extract, total antioxidant capacity, shelf life, food protection

B3

[15]

THE EFFECT OF MANGOSTEEN (*Garcinia mangostana*), CINNAMON (*Cinnamomum verum*) AND CHILLI (*Capsicum annum*) EXTRACTS IN MINIMIZING AUTOXIDATION OF SESAME (*Sesamum indicum*) OIL

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ABSTRACT

During the past two decades, the use of natural plant extracts as antioxidants in edible oils is becoming popular to prevent the use of synthetic antioxidants. This study was carried out to study the effect of three natural plant extracts; mangosteen (*Garcinia mangostana*) peel, cinnamon (*Cinnamomum verum*) and chilli (*Capsicum annum*) extracts on autoxidation of sesame (*Sesamum indicum*) oil. Dried powder (20 g) of each plant was mixed with 30 ml of acetone, stirred for 30 min at room temperature and filtered and the solvent was removed by rotatory evaporator to get plant extracts. Sesame oil was heated to 60 °C and plant extract was added at 5 mg per 100 mg of sample while stirring. Just after adding plant extracts, oil samples (5 mL) was taken into glass vials, flushed with nitrogen and closed with caps to assess the oxidative stability by accelerated oven storage test (at 65±5 °C for up to 28 days). Samples were drawn on 1, 3, 5, 7, 14, 21 and 28 days and analyzed for chemical parameters such as peroxide value (PV), thiobarbituric acid reactive substance (TBARS) assay and specific absorptivity of conjugated dienes (CDs) and conjugated trienes (CTs). All samples treated with plant extracts showed increased stability against autoxidation than control. The samples treated with mangosteen peel showed significantly ($p<0.05$) lower rate of percent increment of PV, CDs, TBARS and CT (2.76, 0.84, 0.12 and 1.14%, respectively) than the samples treated with other extracts. The samples treated with cinnamon showed significantly ($p<0.05$) higher percent increment of PV and CTs (3.18 and 1.97%, respectively) than the samples treated with chilli extract (2.99 and 1.42%, respectively) while CDs and TBARS values of samples treated with cinnamon extract were significantly ($p<0.05$) lower than the samples treated with chilli extracts. Therefore it is concluded that all three plant extracts can act to reduce the autoxidation of sesame oil, however, the mangosteen

peel extract is the most effective to reduce the autoxidation of sesame oil. Thus, mangosteen peel, a waste product, could be effectively used at low cost to increase the stability of sesame oil against autoxidation.

Keywords: autoxidation, natural plant extracts, oxidative stability, sesame oil

B4

[16]

HELABOJUN- A SUCCESSFUL MODEL OF AGRI-FOOD VALUE CHAIN IN SRI LANKA

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ABSTRACT

A program was initiated 10 years back by the Women's Agriculture Extension (WAE Unit) of the Department of Agriculture (DOA) as a micro/small-scale road side food stalls for traditional foods. Later in 2012 the concept was developed into value chain comprising a mini food court system known as *Helabojun*. The objectives of the center are; to popularize and sustain the 'True Sri Lankan taste', to provide nutritious and healthy food at a reasonable price to people; contributing to entrepreneurship development and to improve the income of low income families. Initially 30 women were employed at the 1st outlet at Gannoruwa in 2012 and to date expanded to 17 *Helabojun* centers throughout the country providing entrepreneurship to 500 women. The Ministry of Agriculture funded the expansion of this program along with funding from projects including Biodiversity for Food & Nutrition. Buildings and some utensils were provided by the DOA and women purchased essential cooking utensils with the assistance of bank loans where necessary. Initially women were trained on food preparation, hygienic practices, customer care and financial management with monitoring done by the WAE. Food is prepared using raw materials procured by women entrepreneurs and served warm at the food courts. Presently, more than 90 different food products are sold along with identification of their nutritional facts. The daily income of the entrepreneurs ranges from SLR 2000-6000 rupees. This concept is effective and has positively influence customer attraction; *Helbojun* outlets are becoming more and more popular amongst locals and tourists. This concept also helps to preserve the traditional Sri Lankan food culture whilst increasing dietary diversity to provide nutritious food for people.

Keywords: Sri Lankan traditional food, women entrepreneurship

B5

[17]

**EFFECTS OF SUCCINYLATION AND HYDROXYPROPYLATION ON
FUNCTIONAL, THERMAL AND TEXTURAL CHARACTERISTICS OF WHITE
SORGHUM STARCHES**

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ABSTRACT

Sorghum is a good alternative to corn for sustainable production as it is a drought tolerant and low input cost crop and is thus considered ideal for extraction of starch. Sorghum is considered a food security crop because of its outstanding agronomic properties. The present study investigated the effects of three levels of succinylation and hydroxypropylation on functional and thermal characteristics of white sorghum (*Sorghum bicolor*) starch. Succinic anhydride was added at 1, 2 and 3% based on starch weight to produce Sc1, Sc2 and Sc3 starches, respectively. Whereas, propylene oxide was added at 10, 20 and 30% level based on starch weight to produce H10, H20 and H30 hydroxypropylated starches, respectively. Swelling power of modified starches was found to be significantly higher than unmodified sorghum starch with succinylated starches having higher swelling power compared to hydroxypropylated ones. Hydroxypropylated starches drastically increased the paste clarity of starches making it suitable for applications in which clear pastes are required. The extent of decline in clarity for modified starches was curtailed on refrigerated storage suggesting reduction in retrogradation tendency. The Sc2, Sc3 and all hydroxypropylated starches showed significantly lower pasting temperature and time to reach peak viscosity suggesting weakening of granular structure on chemical modification. Percent retrogradation calculated using differential scanning calorimetry showed significant reduction for H10, H20, H30, Sc2 and Sc3 starches. The least percent retrogradation was observed for H30 which showed only 0.82% retrogradation compared to 25.86% for unmodified starches. The study suggested the potential of chemically modified sorghum starches to be exploited on commercial scale as additives in food products to improve the quality.

Keywords: sorghum, starch, hydroxypropylation, succinylation

B6

[18]

SCREENING OF SOME COWPEA (*Vigna unguiculata* (L) WALP) LINE FOR RESISTANCE AGAINST STRIGA INFESTATION (STRIGA GESTINOROIDES)

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ABSTRACT

The research was conducted at international institute of tropical agriculture (IITA), Kano station. Farm located at Minjibir local government. A total of twelve cowpea breeding lines were screened for *striga* resistance. Results showed varietal difference with respect to *striga* infestation. Among the cowpea varieties, IT07K-289-29, IT08K-124-15, IT08K-137-7, IT08K-180-15 and IT97K-499-35 showed complete resistance to *striga* while cowpea varieties IT07K-263-2-9, IT07K-273-2-3, IT08K.175-2, B301 and IT08K-126-4 showed resistance or tolerant to *striga* on the other hand DANILA and IT07K-251- 2-7 are susceptible to *striga* and produced low yield.

Keywords: *striga*, cowpea resistance, cowpea susceptible, tolerance

C1

[19]

**APPLICATION OF A NEW GRAIN FORTIFICATION TECHNOLOGY TO
IMPROVE MICRONUTRIENT CONTENT AND ANTIOXIDANT ACTIVITY OF
RICE**

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ABSTRACT

Although there are methods such as dusting, coating and extrusion to fortify rice, they are not promising due to poor penetration, low retention and fortificant dependency. This study was carried out to develop a method to improve rice fortification by removing air barriers of the rice kernel for the easy diffusion and fixation of nutrients in the endosperm. To fortify rice with selected micronutrients (iron and zinc), paddy was hot soaked (70 °C) under vacuum (- 0.6 bar) in Fe²⁺ or Zn²⁺ solutions (400 ppm) during the first hour followed by 2.5 h, under atmospheric pressure. Both of the samples exhibited the optimum fortifications as recommended by World Food Program (Fe²⁺: 46.59±0.37 ppm and Zn²⁺: 67.24±1.36 ppm) with a greater significance (P < 0.05) compared to unfortified raw rice (Fe²⁺: 13.11±1.98 ppm and Zn²⁺: 25.02±1.50 ppm) and parboiled rice (Fe²⁺: 12.38±0.91 ppm and Zn²⁺: 23.53±1.03 ppm). There were no significant (P>0.05) differences between both Fe²⁺ and Zn²⁺ contents in fortified rice after washing, confirming their greater retention. A seven point hedonic scale showed that the overall acceptability for both iron and zinc fortified rice were significantly (P < 0.05) higher than the parboiled rice without fortificants. And also fortification with antioxidative substrates (rosemary extract and rice bran extract) showed significantly (P<0.05) improved antioxidant activity of rice when analyzed with TBARS method. Currently an industry-ready grain fortification unit is being developed to introduce this new technology to public.

Keywords: fortification, vacuum, diffusion, micronutrients, antioxidants, parboiling

C2

[20]

THE EFFECT OF THE ADDITION OF OKARA FLOUR ON THE PROXIMATE ANALYSIS AND AMINO ACID COMPOSITION OF BEEF SAUSAGE

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ABSTRACT

Okara is the main by-product of soymilk industries. Okara have highly valuable components including soy fiber and soy protein. Okara has high potential market. This is due to their high protein content. Amino acids are the monomers that make up proteins. Plant protein was healthier than animal protein since the source of animal protein such as red meat can cause disease such as cancer. Hence the objective of this study was to determine the effect of the addition of okara flour on the proximate analysis and amino acid composition of beef sausage. Beef sausage contains 100% beef and 0% okara while optimised okara sausage contains 89.59% beef and 10.41% okara. The optimised okara sausage formulation was suggested by design expert software. The addition of okara flour in beef sausage gives significant different in proximate analysis. Aspartic acid, threonine and tyrosine were present in beef sausage while absent in optimized okara sausage. On top of that, serine, glycine and arginine were present in optimised okara sausage while absent in beef sausage. In Addition, beef sausage was found to contain higher amount of most amino acid compared to optimise okara sausage except for methionine, lysine, isoleucine, leucine and phenylalanine.

Keywords: proximate, sausage, okara, beef, amino

C3

[21]

EVALUATION OF THE NUTRITIONAL VALUE OF SELECTED BANANA VARIETIES GROWN IN SRI LANKA

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ABSTRACT

There are nearly 30 varieties of banana (*Musa* spp.) are grown in Sri Lanka. Some of them are indigenous while the others are exotic. In the present study, five banana varieties commonly grown in Sri Lanka, namely *Seeni kesel*, *Ambul kesel*, *Kolikuttu*, *Rathambala* and *Puwalu* were evaluated for their nutritional composition. Samples of each banana variety were collected from different geographical locations of the country representing all agro-climatic zones. Healthy and undamaged fruits were collected, cleaned and air dried at 45 °C, pooled and stored at 4 °C for further analysis. Proximate and mineral composition of each sample were determined and presented on fresh weight basis. Moisture, ash, crude fat, crude protein and total carbohydrate contents were determined using AOAC methods. The moisture content ranged between 67.24±2.19 and 73.14±0.56% while the crude protein content ranged between 1.20±0.02 and 1.41±0.04%. The corresponding ranges for ash, total carbohydrates and crude fat were 1.18±0.05 - 3.89±0.38%, 13.46±0.36 - 26.46±0.36% and 0.14±0.00 - 0.20±0.02%, respectively. All varieties of banana contained Ca, Mg, K, Na, Fe, Ba, Zn, Mn, Cu, Sr, Rb and Al in considerable quantities while Cr, Co, Ni, Se, Mo, V, Ga, Cd, Bi, As, Li and Be were detected in minute quantities. Comparatively, *Seeni kesel* was found to be the superior (p<0.05) source of essential mineral elements. Among highly concerned heavy metals, the highest Cr and Cd contents (p<0.05) were found in *Seeni kesel* while *Puwalu* contained the highest As content, which might be resulted by malpractices of cultivation, artificial ripening, packaging and storage.

Keywords: ash, crude fat, crude protein, total carbohydrate, mineral composition, proximate composition

C4

[22]

**MACRONUTRIENT AND MINERAL COMPOSITION OF SELECTED
TRADITIONAL RICE VARIETIES IN SRI LANKA**

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ABSTRACT

Rice (*Oryza sativa*) is the staple food in Sri Lanka. Being a country rich in biodiversity, over 3000 rice varieties have been reported in the country. This study was carried out to investigate the macronutrient composition and mineral composition of selected common traditional rice varieties in Sri Lanka. Six traditional red rice varieties, one traditional white rice variety, two improved white rice varieties and one improved red rice variety were collected representing all the agro-climatic zones of Sri Lanka. Five hundred grams each sample was cleaned, dehusked, ground and pooled to obtain a composite sample. The prepared rice samples were analyzed for measure the moisture, crude fat, crude protein, ash and total carbohydrate contents. Mineral composition was analyzed using inductive couple plasma mass spectrophotometry (ICP-MS). The results indicated that crude fat contents of rice varieties varied from $1.59 \pm 0.01\%$ to $2.87 \pm 0.20\%$, crude protein contents varied from $7.60 \pm 0.20\%$ to $9.31 \pm 0.63\%$, ash contents ranged from $0.84 \pm 0.03\%$ to $2.95 \pm 0.01\%$ and total carbohydrate contents varied from $65.80 \pm 0.79\%$ to $79.30 \pm 0.38\%$. Red rice varieties were rich in Na, Mg, K, Ca, Al, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Sn, Li, Be, V, Ga, Rb, Sr, Mo, Cd, Ba and Bi than white rice varieties. Further traditional rice varieties were richer in all the nutrients and minerals analyzed compared to improved rice varieties. The results have shown that traditional rice varieties are good sources for fulfill most of the daily mineral requirement of human.

Keywords: agro-climatic zones, macronutrients, minerals, traditional rice

D1

[23]

**COMPARATIVE STUDY OF SINGLE CELL PROTEIN PRODUCTION WITH
BAKER'S YEAST AND MIXED CULTURE OF TODDY FROM PAPAW FRUIT
JUICE**

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ABSTRACT

The need of protein containing quality food has become an unavoidable requirement for the survival of human population in future. This study was aimed to test the efficiency of baker's yeast and mixed culture of toddy to produce Single Cell Protein (SCP) from papaw fruit juice in the Liquid State Fermentation (LSF) with fermentation media with the composition of Glucose 10g/L, MgSO₄ 0.5g/L, NaCl 0.1g/L, CaCl₂ 0.1g/L and KH₂PO₄ 1g/L as control medium and 100 ml/L of papaw fruit juice was replaced instead of glucose for papaw medium. Culture growing conditions of the fermentation process such as time (3 days) and temperature (30°C) were optimized, the SCP production was 40.36 % with baker's yeast and 42.75% with palmyrah toddy mix. When the carbon source was replaced with 5% the SCP production was increased to 41.8% with baker's yeast and the SCP production was increased to 43.12% with toddy mix. This comparative fermentation study with baker's yeast and palmyrah toddy mix revealed that palmyrah toddy mix generates significantly higher protein content (p=0.05) than that of baker's yeast. Since cheap, naturally available, less labour and machinery involved palmyrah toddy mix yielded higher SCP than the expensive and processed baker's yeast in the papaw extract added fermentation medium, palmyrah toddy mix could be recommended for the preliminary level research studies in the college labs of our country.

Keywords: baker's yeast, papaw fruit juice, palmyrah toddy mix, single cell protein

D2

[24]

**URBAN CONSUMERS' PERCEPTION ON PROCESSED FRUIT PRODUCTS: A
STUDY FROM KURUNEGALA DISTRICT, SRI LANKA**

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ABSTRACT

A significant portion of locally grown fresh fruits goes waste due to lack of processing opportunities. With a view to identify potential processed products and the consumer preferences for product types, a study was conducted with urban consumers of Kurunegala District, Sri Lanka. The availability of processed fruit products was reported using a sample of 30 supermarkets. A questionnaire based consumer survey was conducted to assess the consumer attitudes on five major products namely, jam, cordial, juice [ready-to-serve (RTS) drink / fruit nectar], pickle and chutney. Their considerations on 14 factors when purchasing those products were evaluated. Consumers' main concern was on flavour, fruit species, price and package size whereas the brand, label information and certifications gained moderate attention. While advertising was the least considered factor, their concerns on nutritional facts, additives and preservatives and the country of origin were also relatively low. Yellow colour was most preferred for jam, cordial, juice (RTS drink/fruit nectar) and pickle while brown was most liked for chutney. Moderate sweetness and sourness were preferred over high or low levels in jam, cordial, juice and chutney while moderately sour and spicy pickle was preferred. The study revealed that commercial exploitation of the available fruit species for processing was low. Further, impression on lack of safety was the major limitation which prevented consumers from purchasing processed fruit products

Keywords: availability, consumer preference, potential, processed fruits, urban

D3

[25]

IDENTIFICATION OF POTENTIALLY PROBIOTIC *Lactobacillus* SPP. FROM DAIRY SOURCES OF SRI LANKA AS CANDIDATES FOR FUTURE FOOD APPLICATIONS

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ABSTRACT

Lactobacilli are among the most important lactic acid bacteria (LAB) used in food production and are gaining increasing attention in the area of probiotics. Isolation and characterization of lactobacilli from under-investigated niches could have the advantage of obtaining strains that may be useful in promoting health or industrial fermentations. Sri Lankan dairies are poorly characterized in these aspects and so, the present study was carried out to select and identify potentially probiotic *Lactobacillus* strains from raw milk and curd (fermented with indigenous starters). To obtain as many LABs as possible, de Man–Rogosa–Sharpe (MRS), MRS-L-cysteine, MRS-sorbitol and M17 media (Oxoid, UK) were used. Isolates were phenotypically characterized and screened for their probiotic potentials by analyzing their tolerance to in-vitro gastrointestinal (GI) conditions. Promising *Lactobacillus* isolates were genotypically identified based on 16S rDNA sequence analysis with universal primers and amplified products were subjected to DNA sequencing at Macrogen-South Korea. Isolates matched with the presumptive identification criteria for LABs (120) were biochemically characterized and identified as belonging to *L. pentosus*, *L. plantarum*, *L. fermentum*, *L. paracasei*, and *L. rhamnosus* species. LABs which were able to survive under provided GI conditions (38) were considered as prospective probiotics. Genotypic identifications of those isolates to their closest relatives revealed that *L. pentosus* 9-10, *L. plantarum* KLB 415 and *L. plantarum* HL-20 as the predominant strains with abundances of 28.9%, 13.2% and 13.2%, respectively. Rest of the dominated probiotics found in their descending order of abundance were *L. fermentum* BCS30 1, *L. fermentum* Akhavan-E1, *L. fermentum* KFC, *L. fermentum* P26-9, *L. plantarum* gp84, *Lb. plantarum* R1, *L. fermentum* LAB-10, *L. paracasei* 4SY1 and *L. rhamnosus* HFI-K2.

Keywords: Lactobacilli, probiotic, functional traits, genotypic identifications

D4

[26]

REPORTING THE *IN VITRO* ANTIMICROBIAL ACTIVITY OF *Pediococcus acidilactisi* FM_24LAB ISOLATED FROM SRI LANKAN FINGER MILLET (*Elucine coracana*)

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ABSTRACT

Probiotics are live micro-organisms which, when administered in adequate amounts, confer health benefit to the host. One of the most important properties of probiotics is the protection against pathogens in the intestinal tract of the host. The objective of the study was to evaluate *In vitro* antimicrobial activity of probiotic strain *Pediococcus acidilactisi* FM_24LAB isolated from Sri Lankan fermented finger millet variety *Oshadha* against sixteen human pathogens including both Drug Sensitive and Multi Drug Resistant (MDR); *Escherichia coli* ATCC 2592 and ATCC 35218, *Staphylococcus aureus* ATCC 6571, EMRSA 17 COCR and EMRSA 16 NCTC 13143, *Enterococcus faecalis* ATCC 49532 and ATCC 700802, *Streptococcus mutans* ATCC 25175, *Streptococcus pyogenes* ATCC 700294, *K.pneumonia* ATCC 35594, *Streptococcus sanguinis* ATCC 10556, *Streptococcus salvarius* ATCC 13419, *Salmonella enterica* ATCC 700408, *Acinetobactor baumannii* ATCC 17978, *E. faecilis* ATCC 49532 and *Shigella flexenari* ATCC 12022. Agar well diffusion assay was performed in triplicate and Imipenem (10mg) were used as positive control. After incubation, the inhibition zone diameters were measured using calibrated caliper. *Pediococcus acidilactisi* FM_24LAB demonstrated very good antimicrobial activity against Drug sensitive *Streptococcus salvarius*. It demonstrated good antimicrobial activity against *E. coli* and *A. baumannii*; Moderate activity against *K. pneumonia* and very low activity against *S. pyogenes* and *S. flexenari*. However, *Pediococcus acidilactisi* FM_24LAB is inactive against Drug sensitive *S. sanguinis*, *E. faecilis* and *S. mutans*. Against MDR organisms, *Pediococcus acidilactisi* FM_24LAB demonstrated very good antimicrobial activity against *S. aureus* 16EMRSA and good activity against *E. coli*. It demonstrated moderate activity against *S. aureus*. In conclusion, the results of the *In vitro* antimicrobial activity of *Pediococcus acidilactisi* FM_24LAB indicate its' ability to produce antimicrobial compounds which acts as prophylactic agents against enteric and upper respiratory tract infection causing pathogens.

Keywords: Antimicrobial Activity, Finger millet, Probiotics, *Pediococcus acidilactisi* FM_24LAB

D5

[27]

PHENOLIC ACIDS, FLAVONOIDS PROFILES AND ANTIOXIDANT ACTIVITY OF TEMPEH PROTEIN HYDROLYSATE PREPARED FROM SOYBEAN TEMPEH

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ABSTRACT

Tempeh, a traditional Indonesian fermented soybean food, has recently been focused on the many fermented soybean foods, because of its superior nutritive qualities and metabolic regulatory functions. However, this tempeh can only be kept for 3 days where the overripe tempeh normally discarded as waste or used as animal feed. Therefore, the overripe tempeh was processed into tempeh flour, defatted flour and into soy protein isolated before it was hydrolysed into protein hydrolysate. The present study was carried out to determine the phenolic acids content, the flavonoids content and antioxidant activities during the preparation of tempeh protein hydrolysate prepared from soybean tempeh. The total and individual phenolic acids and flavonoids were determined by using high performance liquid chromatography. For determination of antioxidant activities, scavenging capacity on 1, 1-diphenyl-2-picrylhydrazil (DPPH) radicals, ferric reducing antioxidant power (FRAP) and β -carotene bleaching assays were conducted. A significant amount of flavonoids, phenolic acids, and antioxidant activities were observed in the samples. The results showed five out of seven flavonoid compounds detected in all samples where catechin (22.22 – 227.81 mg/g dry weight) and epicatechin (106.74 – 283.11 mg/g dry weight) were the most abundant compounds identified. Nevertheless, total flavonoid content showed significant increment ($p < 0.05$) during the preparation of tempeh protein hydrolysate from 198.53 mg/g to 680.11 mg/g dry weight. The trend was also observed in phenolic acids content where it increased significantly ($p < 0.05$) from 23.62 mg/g to 77.36 mg/g dry weight for tempeh protein hydrolysate and the most abundant phenolic acids was found to be ferulic acid. Correlations showed that increases in flavonoids and phenolic acids content contribute to the high antioxidant properties where tempeh protein hydrolysate exhibited the highest antioxidant properties compared to other samples. Therefore, tempeh protein hydrolysate can be considered as potential functional food ingredients that can be used in food and pharmaceutical applications.

Keywords: tempeh, protein hydrolysate, isoflavone, phenolic acids and antioxidant activities

POSTER PRESENTATIONS

P1

[28]

**AN ANALYSIS OF THE SUCCESS FACTORS FOR THE EFFECTIVE
IMPLEMENTATION OF SMALL SCALE FARMS: A CASE STUDY OF THE
GARFAGNANA VALLEY, TUSCANY, ITALY**

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ABSTRACT

This research is based in the empirical and theoretical case study of Garfagnana Valley at the Tuscany region, in Italy. It aims to report findings over small scale farms, embracing traditional and innovative rural methods. Small rural production usually encounters many challenges such as weak policy protection, population ageing, and market pressures. However, there is a big resilience from these farmers to persist with their activities. In order to protect their rural activities without expanding their scale of productivity a diversity of farm strategies emerged. Among them, multifunctional practices are an alternative which enables many small scale producers to maintain their practices. Moreover, some cultural and environmental aspects add to this region important values, acknowledging the area with internationally perceived high quality food products. Another important strategy is making farming lifestyles once again attractive to engage new generations back to rural activities by innovative rural business models. Thus, low productivity and products of high added value are a common strategy which is usually combined with pluri-activities in the rural sector. Yet, small scale production needs specific kinds of agricultural logistics, and dynamics. To enable these processes, the food supply chain must be adapted to the farms' context. Therefore, the main factors of how and why small scale farms in the Garfagnana Valley maintain their projects successful are described in this paper, for a better understanding of the rural sector, and possible development of further studies and policies related to the topic of study.

Keywords: small scale farms, resilience, rural, Italy

P2

[29]

PHYSICOCHEMICAL, PHYSICAL, TEXTURAL AND SENSORY QUALITY OF STRAWBERRY SET YOGHURT AS AFFECTED BY TOTAL MILK SOLID CONTENT ADJUSTED USING 5 FOLD ULTRAFILTERED COW SKIM MILK RETENTATE

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ABSTRACT

The aim of the study was to investigate the effect of adjusting total milk solids (TMS) level in the yoghurt mix by adding 5 fold ultrafiltered cow skim milk retentate on physicochemical, physical, textural and sensory quality of strawberry set yoghurt. Cow skim milk was standardized to 1.5% fat and 3 levels of TMS (10.5, 11 and 11.5%), by adding calculated amount of cow milk cream and 5 fold ultrafiltered cow skim milk retentate, respectively. Amount of strawberry pulp and sugar was maintained at 6 and 8%, respectively in the final product. Whey syneresis was not observed in any of the yoghurts made. Water holding capacity (WHC) and values of textural attributes increased significantly ($p < 0.05$) with increasing TMS level. Flavour, body & texture, overall acceptability and acidity scores decreased significantly ($p < 0.05$) with increasing TMS level, while colour and appearance score was not affected. Total milk solids level of 10.5% was observed to be optimum for the production of acceptable strawberry set yoghurt. Developed yoghurt was compared with conventionally made strawberry yoghurt in which low heat skim milk powder was used for the standardization of the yoghurt mix. Acetaldehyde concentration, WHC, values of textural attributes, body and texture, overall acceptability scores and pH were significantly ($P < 0.05$) higher in developed compared to conventional strawberry yoghurt. Developed strawberry yoghurt had 1.30 times more protein and 1.24 times less lactose compared to conventional yoghurt making it more suitable for current consumer needs.

Keywords: ultrafiltered retentate, textural attributes, whey syneresis, water-holding capacity, acetaldehyde

VIRTUAL PRESENTATIONS

[30]

**“HOW EATING HABITS, DENTAL CARIES AND ORAL HYGIENE REFLECT
QUALITY OF LIFE OF PEOPLE IN SLUMS”- A PILOT STUDY REPORT IN
SOUTHERN INDIAN CITY OF MYSORE**

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ABSTRACT

Introduction: India, sixth biggest country by area is the second most populous country. Factors contributing to the steady rise in prevalence of periodontal disease include poor oral health awareness. Annual health budget is 2% of Gross National Product but no specific budget is earmarked for oral health. Oral health knowledge is considered to be an essential prerequisite for health-related behavior. Although only a weak association exists between knowledge and behavior in cross-sectional studies, there are studies that establish an association between knowledge and better oral health. Nutritional and food security refers to regular ongoing access to enough quality food by all members of the family for an active, healthy life without compromising the satisfaction of other basic needs. Inadequate food and the deprivation of certain nutrients can also affect oral health. Severe enamel hypoplasia and chronic periodontal disease are associated with a lack of vitamin D, scorbutic gingivitis (scurvy) is associated with vitamin C deficiency and dental caries is associated with a carbohydrate-rich diet. Thus, due to a diet low in nutrients and high in carbohydrates, individuals in situations of FI may experience poor oral health. The aim of the present study was to conduct a systematic review of the literature on the oral health of individuals in situations of food insecurity. The hypothesis is that such individuals have poorer oral health than those in situations of food security. **Purpose:** The Purpose of this study was to clinically detect dental caries and overall oral hygiene –related quality of life people in slums of Mysore. **Methods:** A cross –sectional study is planned in a slum area to detect dental hygiene in slums of Mysore city. **Results:** Pilot study was done in 202 families. A qualitative assessment of dietary habits shows that maximum consumption of carbohydrates [Rice], and moderate consumption of protein[Wheat] in afternoon and night in weekdays. And more consumption Of Junk Food in Weekends. Only few families used tooth brushes with good oral hygiene. Out of this, 106 children were examined. Study done showed that stains , calculus and dental caries were present in the age group between 6 to 18 years. In the age group between 6-10, showed 80% grade 1 calculus and 20% grade 2 and 80% decayed teeth. In the age group between 11-14 years showed 70% grade 3 and 30% grade 1 and 80%, decayed teeth. In the age group between 15-18 years showed 95% grade 1 5% grade 2 and 20% decayed teeth. **Recommendations:** We, as dentists, will have to keep reinforcing the importance of correcting all aspects related with brushing and flossing along with the importance of regular checkups. The task of spreading this awareness extends beyond our clinic to general masses and it will have to be achieved in a similar way by various outreach programs and relevant public health awareness measures through various mediums, such as Print/Press Media, Audio/Radio/Television, Internet, and Organizing Social

Activities. All of these and more innovative methods of reaching the public will not only ensure a healthy individual but a healthy society as well.

Keywords : enamel hypoplasia, dental hygiene, stains and calculus

[31]

**FOOD SAFETY PROCEDURE IN BASE HOSPITALS OF SRI LANKA; A CASE
STUDY IN BALAPITIYA BASE HOSPITAL**

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ABSTRACT

The concept of food safety becomes a critical issue when the food is prepared and served to hospitalized patients. This study was carried out to investigate the knowledge on precepts and practices related to food safety and personal hygiene among food handlers of Balapitiya Base Hospital, Sri Lanka. An interviewer-administrated questionnaire, observations and discussions were used to gather information. All 40 members in food service management system included by using random sampling and out of them 43% of males and 57% of females. Their average age was 39 years and 42% of them had education up to the secondary level (6-11). The results showed that insufficient knowledge on food hygiene practices; being 44.8% of them not knowing the correct refrigerator temperature; 50.6% having the view that chilling or freezing eliminates harmful germs from food; 20.4% responding fresh milk does not need refrigeration for its storage; 28.7% not knowing that prepared food stored without covering can result in contamination. However, 85.6% knew that raw food should be separated from cooked food. The knowledge of workers regarding personnel sanitation was satisfactory. Those workers responded that washing hands after using toilet is consequential. It was observed physical availability of two separate tiled floor rooms for the storage of raw materials; a separate place for cutting and washing; a tiled clean kitchen floor; and all workers having trimmed clean nails and short hair. However, there were some visible drawbacks on their food safety practices: keeping vegetables on the floor during raw material inspection; keeping cooked food utensils opened prior to distribution; and unattainability of uniforms, gloves and masks for food handlers. Since, the workers' knowledge of food safety aspects and the safety practices were inadequate, it is important to enhance their knowledge by education and training programs on food safety and hygiene to provide safe food for patients.

Keywords: food safety, practices, knowledge, drawbacks

