

**1st International Conference on
Innovations in Food Ingredients
& Food Safety
IFIFS 2018**

BOOK OF ABSTRACTS

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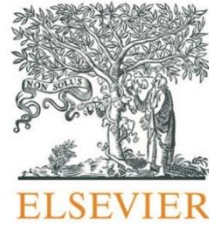
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PREFACE

The global food system today is beset by serious challenges and risks. Food demand is on rise due to population growth and changing consumption patterns; production and prices have become more volatile; hunger and poverty levels remain high and unsustainable practices exacerbate environmental challenges. Food produce is increasingly called upon to address a wide range of critical needs; safe and nutritious food for nine billion people by 2050; and higher and more resilient incomes for livelihoods. Though food-processing industries have grown tremendously, food safety and quality remain always the prime concerns of consumers and food processing industries. Unsafe food causes both acute and chronic illness, and reduces the bioavailability of nutrients, particularly for vulnerable consumers. An estimated 600 million (almost 1 in 10) people in the world fall ill after eating contaminated food and 420,000 die every year. Diarrheal diseases are the most common illnesses resulting from the consumption of contaminated food, causing 550 million people to fall ill and 230,000 deaths every year. Food-borne diseases impose a heavy social and economic burden on communities, especially affecting their health care systems, and economic productivity. Implementation of food safety standards is important for the food industry in order to meet the consumer expectations. Changes in food consumption patterns and the growth of international megabrands have put pressure on the food industry, especially in New Product Development (NPD). The industry's approach to NPD stems primarily from innovation sourced from either mergers and acquisitions or multinationals for products, or from suppliers for processes. With the variation across segments appearing to be competitive, it is crucial for manufacturers to understand that success is not only about marketing efforts or about the quality of a product, but also about the brand's capability to observe current trends in order for its products to reach potential consumers.

The aim of the **1st International Conference on Innovations in Food Ingredients & Food Safety** (IFIFS 2018) is to bring together researchers, industries and policy developers to discuss on challenges, trends and innovative approaches for safer and sustainable food and beverage produce. The 1st day is dedicated to the dissemination of the outcomes of two ERASMUS+ capacity building projects (**SEA-ABT** and **ASIFOOD**), which are related to food quality and safety of food and beverages and to a hot topic on sugar and sweeteners. The 2nd day will focus on timely and trending topics that address the opportunities and challenges in the emerging innovative technology for sustainable and safer production of food and beverages. The abstracts of the presentations delivered on the 2nd day of the Conference are included in this book. The IFIFS 2018 Scientific and Organising Committee thank all the conference attendees for their participation and their active contribution.

Anil Kumar Anal
Gerhard Schleining

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CONFERENCE OPENING

#2: Potential Savings in CIP of Food Production Plants Through Hygienic Design

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This is an Analysis of potential savings in CIP of food production plants through Hygienic Design for the food industry. Via defined CIP programs we compare different valves and sensor connections to give guidance to the food processor in selecting the right components in relation to effective and easy cleanability. We kept the parameter for soiling and CIP constant to have information about the design effect on the cleanability.

To reduce the risk of undesired microbial growth, effective CIP is vital. Hygienic design represents a massive opportunity for savings by:

- Shorter cleaning time, increasing productive time
- reduced chemicals and additives
- reduced power, steam and fuel consumption
- reduced water and water treatment costs

For an optimal CIP-process it is important that the installation is clean and in good hygienic condition, as quickly as possible. To identify the real time of CIP success, alkaline cleaning agent with a redox-indicator, an inorganic electrolyte (persulfate technology) was used for this study, which changes from violet through green to yellow, depending on the concentration of organic material remaining.

A comparison of the analyses of 6 dairies with an annual turnover of 140 Mio to 270 Mio €, organized by the TU Munich in 2003 gave the following information's: Composition of CIP costs like cleaning materials, chemicals, power, water, waste water and steam recorded from the 6 dairies. CIP Total Costs in relation of Hygienic Design-related and non-HD-related CIP costs have been analyzed.

The total cost of CIP-cleaning per kg raw milk intake [ct/kg] of the 6 dairies varies between 0,1 to 0,7 ct/kg milk, because of different criteria: for example: which foodstuffs are produced, how often and how thoroughly will the process be cleaned and how big is the product volume.

CIP Duration per Sensor-Connection, valve combination and process modules where measured choosing HD installation versus T-piece installation and it demonstrates that the payback of the investment for Hygienic Design was achieved in one to seven days depending on the process component plus the added bonuses of faster processing, increased plant capacity and an extended plant lifetime.

Keywords

Hygienic Design, Potential Savings

**SESSION 1: INNOVATIVE FOOD INGREDIENTS AND FOOD
QUALITY**

Oral Presentations

#32: Innovative Encapsulation Strategies of Bioactives in Glassy Matrices

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Encapsulation at micro- or nano-scale is an innovative strategy to enhance the functionality of bioactive and liable compounds by increasing stability under stressing conditions, controlling their delivery and release, thereby their functionality in food matrices could be modulated. The application of various conventional (freeze-drying, spray-drying) and novel (e.g. liposome encapsulation, spray drying, spray chilling) technologies, also in combination, allows to produce low moisture-to-dry encapsulates with enhanced functionalities (e.g. solubility) and shelf-life longer than the corresponding native or liquid state. The achievement of powders in a glassy/ amorphous state has been recognized as a critical factor for both stability and technological functionality of encapsulated bioactives, generally obtained by the use of high molecular weight carbohydrates (starch, maltodextrins, cyclodextrins) as coating or dispersing materials.

Milling is a largely used process in the pharmaceutical drug formulation mainly for reducing drug particle size. However, starting from a stable crystalline state, the mechanical stresses during processing may also induce structural changes and the formation of metastable polymorphic forms or amorphous materials. Co-milling, where two compounds are subjected together to the same milling process, is also used in the development of pharmaceutical ingredients with physical and physico-chemical properties different from those of the individual compounds, alloys or nano- or micro-dispersions, scarcely used in the food sector.

In this presentation the results of the application of conventional technologies of encapsulation by desolvation (spray-drying, freeze-drying) and co-milling as solid-state technology on bioactive compounds of different nature and functionality (limonene, phycocyanin and olive leaves extracts) will be discussed and compared highlighting aspects related to encapsulation efficiency and stability.

Keywords

encapsulation, bioactives, co-milling, freeze-drying, stability

Acknowledgements

The study on olive leave extracts carried out by R. Gonzalez Ortega are funded by the REP-EAT, MCSA project (N° 713714)

#16: Effect of Disaccharides on the Physical Properties of Rice Starch Edible Film

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The effect of concentration of some disaccharides (sucrose, maltose, and trehalose) on rice starch-based edible film was studied. Samples were prepared containing 3% (w/w) starch with 0, 10, 20, 30% (w/w) disaccharide added to the starch as a plasticizer. The thickness, moisture content and water solubility of film increased, while the transparency of film decreased with an increase in concentration of disaccharide for all types in the present study. Mechanical properties of film showed different results between with and without disaccharide during storage for 4 weeks. The breaking stress of film without disaccharide increased and breaking strain decreased with an increase in storage. The disaccharide decreased breaking stress of the film with an increase in storage time, while the breaking stress of film without disaccharide nearly unchanged. The breaking strain of the films with 10% of disaccharides were higher than the film without disaccharide, the breaking strain of films with 20% of disaccharides and 30% of sucrose and trehalose were not difference with that of film without disaccharide, while 30% of maltose was less than that of film without disaccharide at preparation day. The tendency of a decrease in breaking strain by storage became progressively grater with an increase in concentration of all type of disaccharide. The X-ray diffraction results showed that the relative crystallinity of the film increased with an increase in concentration of sucrose and that decreased with an increase in concentration of maltose and trehalose in preparation day. After storage, the intensity and relative crystallinity increased with an increase in concentration in all types of disaccharides. Moreover, the increasing trend of the relative crystallinity increased in the order of sucrose, maltose, and trehalose. Pearson Bivariate Correlation showed high correlation between concentration of disaccharide and some properties of film, which were thickness, transparency, moisture content, water solubility, and mechanical properties. Adding disaccharide as a plasticizer affected to the properties of rice starch film by concentration and type of disaccharide due to the hydroxyl groups of disaccharide.

Keywords

starch film, disaccharide, mechanical properties, recrystallization

#23: Sequential Extraction of Hyaluronic Acid and Collagen from Chicken Eggshell Membrane

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Hyaluronic acid (HA) and collagen are highly valued substances traditionally extracted from animal tissues through complex, arduous processes. But, in this study, both substances were extracted from eggshell membrane through a sequential process composed of simple methods. HA was extracted using two methods: (1) mixing with salt solution and (2) by papain digestion. In the first method, the salt concentration, extraction period, and volume of the extraction solvent were varied. It was found that HA yield initially increases with salt concentration, the highest being 0.88 mg/g sample using 0.5 M NaCl solution, but decreases at higher salt concentration. Meanwhile, in papain digestion, the highest yield, 5.48 mg/g, was obtained from samples incubated at 60°C. The HA yield were less at lower incubation temperatures.

Following HA extraction, collagen was extracted from the residual samples with acetic acid solutions of varied pH. The maximum yield was obtained at pH 2. But sample pre-treatment by ultrasonication was found to increase yields. The most significant improvement was observed in samples sonicated at 75% amplitude. Meanwhile, the highest collagen yields were obtained from residual samples recovered after papain digestion. Amount of collagen extracted from samples digested at 20°C was about 38 mg/g sample but decreased with increasing incubation temperature likely due to collagen denaturation.

Keywords

Hyaluronic Acid, Collagen, chicken eggshell membrane, ultrasonication, papain digestion

#26: Enzymatic Processing and Spray Drying of Honey Jackfruit (*Artocarpus Heterophyllus*) Powder

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Honey jackfruit (*Artocarpus Heterophyllus*) was spray-dried into powder after enzyme liquefaction and characterization of the resulting powder was analysed. The enzymatic liquefaction process was optimized with Pectinex® Ultra SP-L and Celluclast® 1.5 L individually or in combinations at different concentrations (0–2.5 % v/w) and incubation time (0-2.5 hours). Treatment with enzymes in combinations showed a greater effect in the reduction of viscosity (83.9-98.8%) as compared to single enzyme treatment (64.8-87.3%). Best parameter was obtained with 1.0% (v/w) Pectinex® Ultra SP-L and 0.5% (v/w) Celluclast® 1.5 L for 1.5 hours. Spray drying process was carried out using different inlet temperatures (140-180°C) and maltodextrin concentrations (10-30 % w/w). The results indicated that the spray-dried honey jackfruit powder produced at 160°C with 30% w/w maltodextrin had the highest product yield (66.90%) with acceptable powder qualities in terms of water activity, solubility, moisture content, hygroscopicity, colour and bulk density. The spray-dried honey jackfruit powder could potentially be incorporated into various food products.

Keywords

Honey jackfruit, Enzymatic liquefaction, Spray drying

SESSION 2: FUNCTIONAL FOODS AND BEVERAGES

Oral Presentations

#6: Stability of Fortified Infant Formulas in the Real Food System

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Micronutrient deficiencies are still a public health issue in least developed countries and food fortification is one of the strategies widely used to try to solve the problem. However, there's a debate on the efficacy of this strategy because of its sustainability and biological efficacy in the real society and not only with clinical trials. Our purpose was to assess the nutritional value, the safety and packaging properties of 13 infant formulas (IF) sampled in retailing stores at distinct storage times in seven countries.

Globally, IFs were always above recommendation for their contents in vitamin A, D and E except for the product stored more than 9 months in the supply chain. Most of IFs produced locally respected the recommendation of peroxide value, $\omega 6/\omega 3$ ratio and mycotoxin contents. However, few products were free of mycotoxins (fumonisin and aflatoxin). The effect of the storage time in the supply chain on the nutritional profile of IF was clear and significant. Expiration dates should be shortened to 12 months to guarantee optimal nutritional quality. In our study, the effect of the type of packaging was not significant because the initial compositions of the infant formulas were very variable according to the producer.

Keywords

vitamins, mycotoxins, packaging, shelf life, peroxides, lipid oxidation

Acknowledgements

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#9: Bio-Prospecting of Riboflavin Producing Lactobacillus Strains of Indigenous Origin

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Riboflavin (vitamin B2), one of the B-groups vitamins, is an essential component of cellular metabolism and is required by bacteria, plants, animals and humans. The inadequate food intake and/or unbalanced food habits rendered the persistence of B2 deficiency among developing and developed nations. B2-producing capabilities of lactic acid bacteria (LAB) add new dimension to food fortification. In current study, a total of sixty-five samples, including fermented milks (curd and lassi) and human feces were collected in respective containers, maintained at 4°C and processed using serial dilution and pour plate method for isolation of lactobacilli. After confirming purity and primary identification of isolates by microscopy, the genus-level identification was confirmed on the basis of 16SrRNA gene amplification using lactobacilli specific primers. All confirmed Lactobacillus isolates were primarily screened for B2 production potential using riboflavin-free growth conditions. The extracellular B2-production in cell free supernatant of tested lactobacilli was assessed by microbiological assays. The positive isolates from micro-assays were tested on genotypic basis for B2-production. Fecal samples were found as highest positive (85%) sample source for lactobacilli as compared to dahi (57.14%) and lassi (50%). In the next stage of microbiological assay, only 4 out of selected 5 were confirmed as B2-producers on the basis of culture-supernatant-mediated supplemental growth of auxotrophic mutant in riboflavin-free growth conditions. Present study also confirmed the preciseness of microbiological assay as a final screening protocol for selecting riboflavin-producing lactobacilli. Moreover, all the self-designed primers worked well and tested strains were found to harbour B2-structural genes on their genomic DNA. Interestingly, both sample types (fermented milks and human fecal) were found to contain microbes harbouring B2-structural genes on their genomic DNA. Present study showed the presence of riboflavin producing capability in both fecal and milk Lactobacillus isolates. Vitamin production by lactobacilli, is a highly important trait for future use of such strains in bio-fortification strategies. The study adds on knowledge in bio-prospecting of vitamin-producing novel LAB strains.

Keywords

Lactobacillus, Riboflavin, Fortification, Bioprospecting

Acknowledgements

Department of Science and Technology, Govt of India for providing research grants

#43: Quality Evaluation of Maltose Syrup Produced from Hydrolysis of Cassava (*Manihot esculenta* Crantz) Starch Using Malted Rice (*Oryza sativa* L.)

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In maltose syrup processing, Maillard reactions occur between reducing sugars and protein and resulted in different qualities of maltose syrup. In some case, browning is desired, for instance, in baking of bread. However, browning is unwanted in canned fruits. Quality of maltose syrup was determined by using different pH levels and amounts of malted rice. In this study, cassava Rayong 9 cv. was used as source of starch and rice Sen Pidao cv. was used as source of amylase enzymes. Paddy rice seeds were germinated for 10 days under ordinary room temperature and alpha-amylase activity was determined daily together with measurements of shoots and roots length (cm). Significant increase in α -amylase activity was observed on day 8. Maltose syrups from cassava starch were prepared using 8-day old malted rice. Two different treatments with varying malted rice concentration (T1: 200g cassava starch: 32 g malted rice; T2: 200 g cassava starch: 48 g malted rice) were prepared and adjusted to various pH levels. The resulting syrups were analysed for physicochemical properties [colour, pH, moisture content, total soluble solids (TSS), % reducing sugar (RS), dextrose equivalent (DE), crude ash and crude protein] and subjected to sensory evaluation. The yield of maltose syrups from different treatments was recorded. Results suggested that pH adjustment within the range of 5.0 - 5.5 and the use of higher malted rice resulted in high RS and DE of maltose syrup. An 8-hour saccharification period of extracted juice with additional overnight storage resulted in decreased pH values for both T1 and T2. Moisture content of maltose syrups ranged from 4.65% – 11.79%. The presence of crude protein in syrups may have contributed to the browning reactions. The L-values signified that the more acidic the sample, the lighter is the colour. The colour of the maltose syrups ranged from light brown to dark brown; and browning intensity increased with increasing pH and malted rice. Samples from pH 4 showed significantly higher yield than the rest of the treatments. In general, syrups studied were more acceptable than the local syrup especially when the amount of malted rice was increased.

Keywords

Maltose syrup, malted rice, dextrose equivalent, α -amylase activity, saccharification

#20: Extraction of Anthocyanin from Mulberry Residue Using Aqueous Two-Phase System

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Anthocyanins from mulberries have tremendous potential as natural colorants and functional food with pharmaceutical purposes in food applications where cheap resource, availability, and quality issues are always concerned. The mulberry residue discharged from the fruit juice and beverage producing factories were utilized as raw materials to extract anthocyanin. The anthocyanin and total sugar content in mulberry residue were 703.67 ± 45.61 mg / 100g and 2.72 ± 0.24 %, respectively. The high level of anthocyanin in mulberry residue proved that this by-product is a promised source for anthocyanin extraction.

An aqueous two-phase system was developed to extract anthocyanins from mulberry residue. Some parameters which may affect the extraction procedure such as temperature, time, concentrations of ethanol, concentrations of ammonium sulfate, and the ratio of solvent/material have been examined. The optimal analysis showed that the maximum recovery of anthocyanin (88.8 ± 0.26 %) and total sugar (85 ± 0.18 %) could be obtained by using an extraction system consisting of 28.08 % (w/w) ethanol, 23.44 % (w/w) ammonium sulfate and 37.97 ratio of solvent / material. In this system, the partition coefficient of anthocyanin and total sugar were 14.3 ± 0.36 and 13.03 ± 0.35 , respectively. Compared with conventional extraction using acidified organic solvent, the aqueous two-phase system extraction not only had high yield of anthocyanins, saved more ethanol, energy and time, but also decreased impurities during extraction.

The extracted anthocyanin from mulberry residue were concentrated to the content of 414 mg anthocyanin / 100g preparations and then studied its stability during storage. The results showed that anthocyanin extracts were more stable at pH < 4 and the temperature ≤ 35 °C. The stability of anthocyanin was significantly reduced by destructive effect of metabisulfite, ascorbic acid and light.

Keywords

anthocyanin, aqueous two-phase system, extraction, mulberry residue, stability

#49: Status and Prospects of Nepalese Traditional Foods and Beverages: A Review

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Nepal is a land of diversity in terms of ethnicity, tradition, socio-culture, topography and agro-climate. This diversity can be seen in the variety of traditional foods and beverage with respect to the methods of preparation, ethnic origination, regional availability, consumption pattern, organoleptic perception and shelf-life. However, the production of majority of Nepalese Traditional Foods and Beverages (NTFBs) is limited to household level and/or cottage scale. Very few of them are commercialized in regional level based on the experience from generations. Although, documents of traditional methods of production of certain NTFBs are available, the biochemical, microbiological, nutritional and safety aspects are short resulting in the batch-wise heterogeneity of the product. Given the examples of multi-nationally commercialized traditional foods from other countries of similar traits, NTFB are promising for national and international markets. This however requires an extensive research and innovation on the pre and post-harvest operations of the raw materials and post production storage, distribution and shelf-life to tailor acceptable homogenous products. This review deals the present status of well-known NTFBs and future prospective.

#44: Physicochemical and Functional Properties of Raw and Processed Moth Bean (*Vigna aconitifolia*)

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Moth bean (*Vigna aconitifolia*), an underutilized legume is known to be a potential source of protein and other nutrients. This study was undertaken to evaluate the impact of cooking and germination on the physicochemical properties and functional properties. Ash, moisture and protein content of raw moth bean flour were significantly higher (3.5g, 3.4g, 3.5g 100g⁻¹) than sprouted and cooked moth bean flour. The weight, volume, density, husk content, hydration capacity and swelling capacity of moth bean (100 seeds) was 3.9g, 3 mL, 1.3 g mL⁻¹, 8.39 (%), 0.04g and 0.04 mL seed⁻¹ respectively. The sprouted moth beans had the highest “b” value of 22.95, showing greater degree of yellowness of seed coat, which differed significantly (p < 0.05) from raw and cooked moth beans. The partial gelation observed at 12 g/100 ml concentration and complete gelation observed at 14 g/100 ml for sprouted and cooked bean flour. The partial gelation for raw moth bean flour was started at 24 g/100 ml and complete gelation observed at 26 g/100ml. Cooked moth bean flour had the lowest foaming capacity (5.88 ml/100 mm) with zero foaming stability. The highest values for foaming capacity and stability were observed in the sprouted (23.94, 11.08 ml/100 ml) and raw (29.62, 6.27 ml/100 ml) moth bean flours. Raw moth bean flour had significantly (p > 0.05) higher viscosities followed by cooked and sprouted moth bean flour, but there was no significant difference in peak viscosity of sprouted and cooked moth bean flour. The microstructures by FE-SEM images of the sprouted sample, cooked were distinctly different from raw moth bean flour samples. Surface of starch granules were ruptured and not as smooth as raw moth bean starch granule. The transition onset temperature analyse by DSC of raw moth bean flour (62.23°C) is significantly lower than sprouted moth bean (63.48°C) and cooked moth bean flour (63.24°C). Significantly higher enthalpy values were recorded with raw moth bean flour (2 J/g) as compared to sprouted and cooked moth bean flour.

Keywords

Moth bean, underutilized legume

#30: Extraction and in Vitro Evaluation of Antidiabetic Efficacy of Bioactive Extracts from Okra (*Abelmoschus esculentus*)

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Diabetes mellitus is a metabolic disorder of glucose metabolism and it is the most common disorder in developed and developing countries. It has been estimated that up to one-third of patients suffering from diabetes mellitus use some form of alternative or complementary medicine. Okra plant has received much attention due to its anti-diabetic properties. The present study was designed to identify the bioactive compound (Protein, Total phenolic content, Antioxidant activity) released in the distilled water by fresh okra. The proximate quantitative and qualitative analysis of dried okra extract were carried out. Moreover, the purpose of the present study was to investigate the inhibitory activities of α -amylase and α -glucosidase. Okra extract possess the highest inhibitory activity against α -amylase (of 11.4 mg/ml) and α -glucosidase (IC_{50} value of 385.44 mg/ml) According to the present review it can be concluded that aqueous extract of okra exhibited the best inhibitory activity on the two enzymes studied. The inhibitory activity of okra extract may have presence of phytochemicals like tannin, flavonoids and saponins.

Keywords

Okra, Diabetes, α -amylase, α -glucosidase, Bioactive compounds

**SESSION 3: FOOD LOSS REDUCTION AND POSTHARVEST
TECHNOLOGY AND MANAGEMENT**

Oral Presentations

#12: The Use of Predictive Models in the Context of Food Spoilage: The Case of White Pudding

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Food spoilage is a major issue for the food industry and consumers as products become unacceptable for human consumption leading to significant food waste and economic losses. In this context, this study combines the use of predictive microbiology and metagenetics in order to predict bacterial evolution in Belgian white pudding. To perform this, the ecology of the product was studied at several times during the storage at constant temperatures, and under three different packaging (food wrap, modified atmosphere 30% CO₂ – 70% N₂ and vacuum packaging), by association of classical microbiological plate counting and 16S rRNA metagenetic analysis on each sample. The bacterial evolution could thus be deduced for the two major spoilage populations in the product, *Brochothrix thermosphacta* and *Pseudomonas* spp. The growth parameters were estimated using the nlsMicrobio package from the open source R software and then used to simulate the microbial behavior in dynamic conditions with three different tools: ComBase, Sym'Previus and baranyi growth function in R software. These results are compared with validation curves, obtained from these durability studies. A relatively good agreement was obtained between the validation data set and the simulations, showing that the approach combining the metagenetics and the simulations based on an accurate database is promising. Performance factors (bias and accuracy factors) indicated no significant structural deviation of the maximal growth rates simulations between observed and predicted values with R and Sym'Previus. An overestimation was mainly observed with R, while an underestimation was generally observed with Sym'Previus and ComBase. None of predictive simulations give an identical microbial curve that the validation data set, but all models show relatively good statistical fittings. This work gives a proof of concept on the feasibility to combine predictive models and metagenetics in order to predict bacterial evolution using different predictive tools. In the future, new gold standards for food quality will need to be developed in order to allow the use of metagenetics as a complementary technique, in association with predictive microbiology, and predictive models needed to be more accurate by taking into account as many growth parameters as possible.

Keywords

Metagenetics, predictive microbiology, white pudding, *Pseudomonas* spp., *Brochothrix thermosphacta*

#27: Application of Moringa Oleifera Leaves Powder to Extend the Storage Life of Tilapia (*Oreochromis niloticus*) Fish

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The study aims to prolong the storage life of Nile tilapia (*Oreochromis niloticus*) fish in ice storage at 5 °C using moringa leaves powder (MLP). The effect of the frozen moringa leaves powder as natural preservatives on biochemical (pH, total volatile base nitrogen (TVB-N), peroxide value (PV) and thiobarbituric acid (TBA) values), bacteriological (total plate count), texture and sensory characteristics changes of fresh Nile tilapia stored at 5 °C was investigated for 12 days, which were significantly lower in MLP treated fish compared to untreated fish. The treated sample remains acceptable during storage in ice at 5 °C up to 11 days, whereas shelf life of untreated sample of tilapia was not extended beyond 7 days. The corresponding microbiological assessment also supports the results of sensory assessment that increased in shelf-life. Meanwhile, the increases of biochemical values and microbiological growth were considerably delayed in treated samples groups compared to the untreated samples group.

Keywords

Nile tilapia, moringa leaves powder, preservation, shelf life

#39: Effects of Drying Temperature on Color and Total Curcuminoid Contents in Turmeric

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Turmeric (*Curcuma longa* L.) is a culinary and medicinal herb widely grown in Asian countries. Its rhizome is a good source of curcuminoids which play an important role as orange-yellow colour pigment, antioxidant and anti-inflammatory agent. Turmeric is generally processed into dried slices and powder for extending shelf-life. In this study, the influence of drying temperature on colour and total curcuminoid contents was investigated. Fresh turmeric rhizomes at the maturity of 9 months were sliced to a thickness of 4 mm, and then cut into a rectangular shape of 4 × 40 × 8 mm before drying.

Drying experiments were conducted using a laboratory made hot air dryer in an overflow mode. Drying was carried out at 5 temperatures (40, 50, 60, 70 and 80 °C). Air velocity and specific humidity of drying air were fixed at 0.5 m/s and 25 g water/ kg dry air, respectively. The fresh samples were dried until the moisture content was lower than 12%. Fresh and dried samples were taken for colour measurement (L*, a*, b*, C* and h°) and total curcuminoid contents analysis. For colour determination of dried samples, dried samples were ground into powder prior to analysis and measured by colorimeter. The drying times used for drying at 40, 50, 60, 70 and 80 °C were 37, 26, 9.7, 6.8 and 3.6 h, respectively. It was found that with a very large difference in drying times, drying temperature did not obviously influence the colour values of dried products. However, b*, C* and h° values of turmeric powder obtained from 70 °C were significantly different from those of 40 and 50 °C (p < 0.05). The three colour values of powders from 70 °C were the least affected which indicated better colour of dried product. In addition, drying temperature did not show significant effects on total curcuminoid contents of the dried samples (p > 0.05). Thus, turmeric slices using a tray dryer could be done at higher temperature for accelerating the drying process without an adverse impact on the colour and bioactive compounds of dried products.

Keywords

Herbs, spices, dehydration, yellow pigments, curcumin

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#31: Simultaneous Vacuum Falling Film and Rotary Evaporation for Producing Sweet Sorghum Syrup

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Simultaneous combination of Vacuum Falling Film Evaporator at 90°C and Rotary Evaporator at 80°C was operated to reduce water content of sweet sorghum and sugarcane juice. Comparison of sweet sorghum and sugarcane concentrate was tested by LSD (Least Significant Difference) or DMRT (Duncan's Multiple Range Test) with 5% confidence interval. Sweet sorghum first concentrate has 44.2°Brix of Total Soluble Solid (TSS) and 30.13 of lightness(L*). They were higher than sugarcane TSS (42.7°Brix) and L*(25.86). Sweet sorghum was further evaporated using rotary evaporator with the duration of 15, 30, and 45 minutes. Overall hedonic test showed the best product is the syrup that produced by vacuum falling film evaporator at 90°C and continued by rotary evaporator at 80°C for 30 minutes. It was proofed by the highest overall Hedonic value 3.34 with taste parameter value of 2.89; aroma 3,29; colour 3,75; and thickness 3.42. It was also accomplished with TSS 87.53°Brix; viscosity 2036.67cP; final L* 25.83; and reducing sugar 52.54%.

Keywords

syrup, falling film evaporator, rotary vacuum evaporator, sugar, sweet sorghum

Acknowledgements

Great thanks to LPPM of Brawijaya University that provide funding for this research.

**SESSION 4: FOOD SAFETY AND RISK ASSESSMENT ANALYSIS
IN FOOD PRODUCTION AND FOOD SUPPLY CHAIN SYSTEMS**

Oral Presentations

#45: Nanostructured Electrochemical Sensors for the Rapid Detection of Pesticides

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Agricultural crops are usually treated with pesticides to control insects and other pests that may affect production yield and quality. The major challenge in the assessment of the amount of pesticides in food and feeds is the development of simple, rapid, cost-effective and reliable analytical methods. The classical mutiresidual methods used by official control laboratories appears, in fact, too complex and expensive to be used by food companies or in decentralised lab testing. The use of screening tools as electrochemical sensors can certainly help in this respect. However, to be effective, sensors should be sensitive, robust and selective for the target analyte. In this talk different approaches for the detection of pesticides in food will be described. In particular, the use of a nanomaterial, as carbon black, for the realisation of sensitive press-transferred and screen-printed electrochemical sensors for phenylcarbmates detection will be described including the rapid procedures developed for the detection in irrigation waters and grain samples. The realisation of molecularly imprinted sensors, for the indirect electrochemical detection of dimethoate coupled with a rapid microextraction extraction procedure for the detection of the pesticide in wheat flour will be also presented. Finally, an innovative strategy for the detection of chlorpyriphos based on the use of an electrochromic imprinted sensor and visual or smartphone assessment of the pesticide will be reported. All the reported approaches, depending on the detection limit and the food commodity appears very promising for the development of rapid screening tools to be used in field or in decentralised lab testing. Their extensive use can reduce the use of pesticides on crops, reducing their effects to the environment and to human health.

Keywords

electrochemical sensors, molecularly imprinted polymers, carbon black, screening of pesticides, carbamates, chlorpyriphos, dimethoate

#4: Development of Wood Packaging Box Containing Bergamot Oil to Control of Gray Mold in Strawberries

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Gray mold, caused by the fungus *Botrytis cinerea*, is a disease of strawberries throughout the supply chain in ambient temperature that limits the quality and storage life of strawberry. Essential oil has become an effective method of controlling molds. Therefore, the objective of this research was to develop the wood packaging containing bergamot oil to control growth of gray mold in strawberry. Firstly, different concentration (100-500 $\mu\text{g g}^{-1}$) of bergamot oil was impregnated in wood. Secondly, wood was used to produce wood packaging box (5cm wide \times 5cm long \times 4cm deeply). Thirdly, strawberries with gray mold (106 cfu ml $^{-1}$) were placed into the packaging box. The results showed that wood box containing bergamot oil at 300 $\mu\text{g g}^{-1}$ showed 100% growth inhibition. In addition, bergamot vapor released from wood packaging could reduce wound and infected strawberries during storage at 10°C for 10 days. It can be concluded that wood boxes containing bergamot oil could be used to inhibit growth of gray mold in strawberry during storage.

Keywords

Strawberries, Gray mold, Bergamot oil, Wood packaging

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#3: Effect of Lime Oil Vapor Against *L. monocytogenes* During Cold Storage

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Listeria monocytogenes is a food-borne pathogen which can grow at low temperatures (5°C). The objective of this work was to investigate the effect of lime oil vapor for inhibiting growth of *L. monocytogenes* during cold storage. Firstly, difference volume of lime oil (100-500 µl) was added into the coconut fiber adsorbent (diameter~6 mm). Then, the adsorbent was placed on the lid of petri dish. Nutrient agar (NA) containing 1 mL of *L. monocytogenes* (10^6 cfu ml⁻¹) was exposed by vapor of lime oil when lid closing for 0, 6, 12, 24 and 48 h. All plates were kept inside the refrigerator (5 °C). The results showed that lime oil vapor at ≥300 µl with exposure time at 12 hours could completely inhibit growth of *L. monocytogenes*. This study has demonstrated a potential of the lime oil vapor as an antibacterial agent against *L. monocytogenes* in cold storage.

Keywords

Listeria monocytogenes, cold storage, lime oil

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POSTER PRESENTATIONS

#1: The European-Southeast-Asian Academy for Beverage Technology (EU-SEA-ABT)

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The Erasmus+ Capacity Building project SEA-ABT (<https://www.food-sta.eu>), aimed to increasing the capacities of Thai universities in delivering training and continuous exchange of best practice between the Thai and European partners, has developed a “**Graduate Diploma in Beverage Technology & Management**” to be offered by KASETSART UNIVERSITY in cooperation with CHULALONGKORN UNIVERSITY and KING MONGKUT'S INSTITUTE OF TECHNOLOGY.

For continuous professional development (CPD) an independent “**European – Southeast Asian Academy for Beverage Technology (EU-SEA-ABT)**” has been established as an organisational frame for organizing high quality trainings and as service center for a structured and sustainable collaboration between universities and the beverage industry. The Asian part of the EU-SEA-ABT is managed by the AGRO-INDUSTRY ACADEMY of the KASETSART UNIVERSITY and the European part is maintained by the ISEKI-FOOD ASSOCIATION (IFA, <https://www.iseki-food.net>).

The EU-SEA-ABT will offer demand-driven, high quality training activities like workshops, webinars and online courses, using innovative pedagogical approaches and teaching tools, which have been developed during the project and will develop further innovative trainings for teachers and food professionals targeted towards the needs of the beverage sector in Thailand and later in SEA.

Partners from Companies as well as Training providers are invited to join the Academy, support the activities and directly benefit from the developments and/or offer their trainings. Academy members can benefit by shaping the developed trainings according to their needs, get reduced fees and become part of a network of companies and universities in the beverage sector.

Keywords

beverage technology, continuous professional development, business to business collaboration

Acknowledgements

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#5: Detection and Quantification of Polycyclic Aromatic Hydrocarbons and Biogenic Amines in Cambodian Smoked Freshwater Fish

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Freshwater fish has been traditionally processed in Cambodia and smoked to give special smoke flavor and crispiness to fish flesh and to preserve it for longer shelf-life. However, traditional smoking may generate some potential carcinogenic compounds, such as polycyclic aromatic hydrocarbons (PAHs) that can affect consumer's health. Benzo(a)pyrene (BaP), the marker of carcinogenicity among PAHs, is considered as very mutagenic and carcinogenic. The smoked fish quality depends not only on the smoking process but freshwater fish quality, which could be downgraded due to improper storage conditions and manufacturing practices. Biogenic amines (BAs) could be produced in fish and fish products by bacteria through decarboxylation of free amino acids, affecting the quality of final products. Histamine and tyramine have been considered as the most toxic among BAs causing difficulty in breathing, itching, rash, vomiting, fever and hypertension to consumers. Therefore, it was inspiring to carry out an assessment study of local smoked freshwater fish quality in terms of chemical contaminants including PAHs and BAs. Fourteen samples were collected from different sources and corresponded to six species of smoked fish including *Clarias* spp, *Micronema* spp, *Ompok bimaculatus*, *Cirrhinus* spp, *Paralabuca* typus and *Rasbora* spp. The samples were subjected to PAHs and BAs analysis by HPLC coupled with fluorescence detection and UPLC coupled to fluorescence detection, respectively. As results, all tested samples contained higher level of BaP and the combination of 4-PAHs (BaP, BaP, BbF and CHR) than acceptable level allowed by European legislation (835/2011/EC) as maximum as 33 times and 90 times, respectively. Moreover, the contaminated BaP and the combination of 4-PAHs were accumulated even higher on fish skin as maximum as 60 times and 142 times higher than acceptable level. In terms of BAs, tryptamine, 2-phenylethylamine and histamine were not detected in the tested samples, but cadaverine was found in 12 samples with concentration of 6 to 172 mg.kg⁻¹. PAHs contamination shows an important impact on the product quality and health risk rather than biogenic amines. Further study on health risk assessment of local smoked fish consumption and an improvement of conventional smoking process need to be taken into consideration.

Keywords

smoked freshwater fish, chemical contaminants, polycyclic aromatic hydrocarbons, biogenic amines

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#7: Detection of 3-monochloropropane-1,2-diol (3-MCPD) Using Molecularly Imprinted Poly (3-aminophenylboronic acid)

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A screen-printed carbon electrode (SPCE) modified with multiwalled carbon nanotubes (MWCNT), gold nanoparticles (AuNP) and molecularly imprinted (MIP) poly (3-aminophenylboronic acid) was developed as the sensing platform to detect 3-monochloropropane-1,2-diol (3-MCPD). In this study, 3-aminophenylboronic acid (3-APBA) was employed due to its affinity towards cis-diol compounds through reversible ester formation. Morphological and electrochemical characterizations of the sensor were done using FE-SEM/EDS and potentiometry, respectively. In comparison to the non-imprinted sensor, the MIP sensor demonstrated a statistically significant ($p < .05$) response towards 3-MCPD in the range 600 to 1500 μM . The response of the imprinted sensor was two times higher than the response of the non-imprinted sensor. Fabrication and measurement conditions were optimized for the concentration of CNT dispersion, AuNP electrodeposition cycles and electropolymerization cycles of the MIP. The effect of the pH of phosphate buffer solution on measurement was also assessed. The optimized sensor showed a linear range at 300 to 1500 μM and the sensitivity was 0.011 mV/ μM . The LOD and LOQ of the sensor were determined to be 192.53 μM and 583.42 μM , respectively. The sensor exhibited rather a good selectivity against 1,3-DCP, 1,2-propanediol, glycerol, and D-glucose. The potentiometric response of the sensor was moderately reproducible with an RSD of <15%. High stability of the sensor was confirmed by the non-significant change ($p > .05$) in response over 20 days of storage at room temperature. The developed sensor can be further developed for sensitive and selective detection of 3-MCPD in real food samples.

Keywords

3-MCPD, 3-APBA, SPCE, molecular imprinting

#8: Investigation of *Fusarium Verticillioides* Infestation on Coloured Thai Corn Hybrids (*Zea Mays* L.) by Metabolite Profiling

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Corn hybrids (*Zea mays* L.) of various kernel colorizations are continually being developed due to increased demand, acceptance, and utilization among consumers. However, this food crop is also susceptible to fungal infestation which could compromise the safety and deterioration. A broad range gas chromatography-flame ionization detector (GC-FID)-based metabolite profiling method was applied to investigate effect of *Fusarium verticillioides* infestation on the low molecular weight constituents of five colored Thai corn hybrids grown simultaneously at the same location and season. Applied metabolite profiling, in combination with multivariate analysis, revealed separation of *Fusarium verticillioides* inoculated corn kernels from their pre-inoculated counterparts. Semi-quantitative analysis revealed the decrease in the majority of lipids (fraction I and II) in post-inoculated kernels. Sugar and sugar alcohols (fraction III) also increased in post-inoculated samples, except di- and trisaccharides. Majority of acid (fraction IV) metabolites showed significant increase at 7 days of post-inoculation time point. Apparently, no previous research regarding effect of *Fusarium verticillioides* infestation on metabolite profiles of coloured Thai corn hybrids currently exists, indicating this method can provide valuable information for safety and nutritional quality assessment within the food industry and nutritional sciences.

Keywords

Corn, fungal infestation, GC-FID, metabolite profiling, *Fusarium verticillioides*, *Zea mays*

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Faculty of Agro-Industry, Kasetsart University

#10: Effect of Freeze Drying on Total Polyphenol Content, Antioxidant Activity and Sensory Characteristics of Shallot (*Allium ascalonicum*)

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The study was conducted to evaluate the effects of freeze drying on the total polyphenol and antioxidant as well as sensory characteristics of shallot. Two periods of process were separated: (i) freezing at -20°C and -80°C from 1 to 7 hours and (ii) drying up at -60°C, evaporation under low pressure (less than 100 millitorr) during 30 to 38 hours. Freezing temperature and time had significant effect on total polyphenolic content of shallot. Freezing at -80°C gave the total polyphenol content (17.38 mg GAE/g DW), which was higher than the freezing at -20°C (16.67 mg GAE/g DW). Total polyphenol content also increased after 3 hours of freezing and there was no significant difference when freezing time increased. Frozen shallot at -80°C and -20°C exhibited nearly 1,1-diphenyl-2-picrylhydrazyl activity (61 to 61.47%). Freeze dried shallot was dried at -60°C for 34 hours to reach the moisture of 4.25%, crispy structure and attractive colors (the purple/native color still remained). The final product exhibited lower total polyphenol content and 1,1-diphenyl-2-picrylhydrazyl activity (13.42 mg GAE/g DW and 48.22%) than those fresh ones (14.64 mg GAE/g DW and 55.12%), respectively.

Keywords

antioxidant activity, drying, freezing, shallot, polyphenol

#11: A NMR-based Metabolomics Approach for Reducing Food Losses: The Example of Minced Pork Meat

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In Europe, the losses of initial meat production represent 20% and more than half of this occurs at animal production, slaughtering, processing and distribution step. In order to control food waste, studies have highlighted the importance of monitoring the microbial diversity of food products because spoilage by bacteria that contaminate the food matrix is a major issue. As such, the combination of metabolomics data with other complementary approaches (classical microbiology and quality parameters) can give the opportunity to gain deeper insights into and have a better comprehension of the spoilage mechanisms. The aim of the current study was to assess meat spoilage through the evolution of bacterial counts and changes in the metabolic profile of minced pork meat using Nuclear Magnetic Resonance (NMR) based metabolomics. Microbiological assessment, pH measurements, gas composition and metabolomics analysis were carried out in meat samples stored under food wrap and under modified atmosphere packaging (70% O₂ – 30% CO₂) at 4, 8 and 12°C during 13 days. All samples were irradiated and then inoculated separately with three dominant bacterial strains: *Brochothrix thermosphacta*, *Leuconostoc gelidum* and *Pseudomonas fragi*. For all conditions, non-inoculated samples are also stored. Analysis were carried out at day 0 and at day 13 for metabolomics analysis, and each day for all other measurements. The multivariate analysis (PLS-DA) reveals a clear discrimination between: (i) the non-inoculated product at day 0 and at day 13, (ii) the inoculated and non-inoculated samples, (iii) the type of strain, and (iv) the packaging conditions. It can be observed that the type of strain inoculated had a most impact on the metabolome than the packaging conditions. Moreover, some metabolites are significantly increased: acetate and glycerol for *B. thermosphacta*, betaine and lactate for *L. gelidum*, threonine and glycine for *P. fragi*. Exploration of the correlations of NMR-based metabolomics results with others microbial parameters suggested their use as possible spoilage tool to provide information on minced pork meat spoilage and to follow intrinsically the evolution of the metabolomics pattern linked to a specific strain in a complex bacterial ecosystem.

Keywords

meat spoilage, NMR metabolomics, *Brochothrix thermosphacta*, *Pseudomonas fragi*, *Leuconostoc gelidum*

#15: Changes in Population of Lactobacillus Bacteria During Fermentation of Cocoa Beans with Mixed Starter Culture

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Mixed starter cultures were applied in cocoa bean fermentation. *Saccharomyces cerevisiae* and a cocktail containing of *Lactobacillus fermentum* 3872 and *Acetobacter pasteurianus* NH6 were introduced into cocoa fermenting boxes with different loading populations (6.0, 7.0 and 8.0 log CFU of *Lactobacillus fermentum* 3872 per kg of cocoa bean) at day zero and after 1 day of fermentation, respectively. Growth characteristics of *Lactobacillus* bacteria were examined during 6 days of fermentation of cacao beans. The study also aimed to determine the effect of partial removal of cocoa pulp juice on the studied *Lactobacillus* bacteria. Results showed that the microbial loads influenced the population of *Lactobacillus* bacteria in fermented cocoa beans. An addition of 8.0 log CFU/kg on the first day results in the highest number of lactic acid bacteria on the second day of fermentation. Removal of 10% cocoa pulp juice by pressing fresh raw cocoa beans caused a significant increase in the population of lactobacilli in the early stages of fermentation. However, between pressing and non-pressing removal of cocoa pulp juice treatments, there was no significant difference in population of *Lactobacillus* bacteria after 4 days of fermentation.

Keywords

Cocoa fermentation, *Lactobacillus fermentum* 3872, starter culture, microbial growth

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#17: Physicochemical Properties and in Vitro Digestibility of Spray Dried Lecithin-Chitosan Multi-Layered Gac Oil Emulsion

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Gac oil from the aril of Gac fruit (*Momordica cochinchinensis* Spreng) is rich in lycopene, β -carotene and unsaturated fatty acids. However, these bioactive compounds are susceptible to oxidation. Therefore, such bioactive compounds are usually protected using microencapsulation technique to broaden their applications in food and nutraceutical industries. The electrostatic layer-by-layer (LBL) deposition technique have been proved to be an effective microencapsulation technique for increase stability of bioactive compounds. Therefore, the objectives of this research were to study the effects of lecithin-chitosan multi-layers on the physical properties, *in vitro* digestion and stability of gac oil microcapsules prepared by spray-drying of LBL deposition emulsion. The primary emulsion comprised of 5% Gac oil and 1% lecithin, had a zeta-potential of -5.95 mV. While, the secondary emulsion comprised of 5% Gac oil, 1% lecithin and 0.4% chitosan, resulting in +53 mV. Adding 30% maltodextrin wall material to each emulsion caused slight drop in zeta-potential. The obtained multilayer emulsions were then spray-dried. The microcapsules from bi-layered emulsion (lecithin-chitosan) significantly improved encapsulation efficiency of gac oil ($p < 0.05$), thus resulting in significant greater amount of β -carotene and lycopene in comparison with the microcapsules from one-layered emulsion. The colour of Gac oil microcapsules are yellow-orange. The bi-layered microcapsules had higher Chroma and lower Hue angle than the one-layered microcapsules. Peroxide value and TBARs of bi-layered microcapsules were significantly lower than one-layered microcapsules ($p < 0.05$). The *in vitro* digestion results showed that β -carotene and lycopene content reduced in each stage of digestion. The bi-layered microcapsule had significantly higher in the remaining β -carotene and lycopene content than the one-layered microcapsules at each stage of digestion. The stable Gac oil microcapsules obtained by this technique can be used in food industry such as a functional ingredient.

Keywords

Gac oil, Multilayer emulsion, lycopene, spray dry, Beta-carotent

Acknowledgements

This research is supported by Thailand Research Fund.

#18: Optimize the Germinated Conditions to Enhance GABA and Total Phenolic Contents in Sprouted Mung Bean

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Mung bean seed is widely consumed in Asian countries. It is an excellent source of protein, dietary fiber, minerals and bioactive compounds. Germination is a low-cost technology which starts with seed water uptake and ends at the protrusion of radicle from the seed. It has been reported that germination of mung bean seeds increases the content of gamma-aminobutyric acid (GABA) and antioxidants, such as phenolic compounds. GABA is an inhibitory neurotransmitter in the sympathetic nervous system and shows many beneficial effects for human health including decreasing blood pressure, controlling stress, diuretic effect and tranquilizer effect. Besides, phenolic compounds are well known to have a wide range of biological activities. Two factors experiment and Central Composite design (CCD) were designed by the statistical software JMP. 10 were employed. To determine the content of GABA and TPC, UV-Vis was utilized at 630nm and 730nm. Firstly, to find out the best soaking conditions of GABA and TPC, the raw mung bean was immersed in distilled water (seed/water: 1/5) at 30°C, 35°C, 40°C for 4, 6, 8 and 10 hours., respectively. It was observed that the highest GABA (1.869 mg/ 100g, dw) was found at 30°C for 8 hours and TPC (1, 310 mg/100g, dw) at 30oC for 6 hours. Secondly, the soaking mung bean, afterward, was placed at three different temperatures 30°C, 35°C, 40°C for various time 12, 24, 36, 48, 60 hours (moisture content >85%). The result indicates that the best suitable germinated condition for synthesizing GABA (2.53 mg/ 100g, dm) was 35oC for 48 hours and TPC (36, 210 mg/ 100g, dm) was 35°C for 24h. Since the study focuses on GABA content rather than TPC, we finally chose the germinated conditions at 35oC for 48h for an optimization experiment. Lastly, the final result indicated that GABA and TPC was optimally accumulated by germinated mung bean at 35oC for 48 hours. The content of GABA (23.09mg/ 100g) and that of TPC (24.84 mg GAE/ 100g) were collected after optimum germinated conditions.

Keywords

GABA, TPC, Germination, sprouted mung bean seed, Optimize

#19: Development and Evaluation of W/O/W Emulsion Stabilized by Polysaccharide-Protein Based Interaction

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The potential of polysaccharide protein-based encapsulation systems to enhance the folic acid stability was evaluated. The optimal conditions to prepare stable W/O/W emulsions was determined by varying the concentration of polyglycerol polyricinoleate, dispersed phase volume fraction and the concentration of whey protein isolate and pectin. The emulsions were further characterized for their size, zeta potential and the polydispersity index. The particle size diameter varies from 1.36 μm to 2.51 μm . The zeta potential of the emulsions was recorded in the range of -31.33 mV to -33.70 mV. Moreover, polydispersity index results indicated that emulsions were monodispersed (PDI < 0.14). The behaviour of the emulsions was then studied in different digestion phases of the gastrointestinal tract. The ζ -potential of the freshly prepared double emulsion stabilized by both whey protein isolate and pectin and only whey protein isolate was recorded as -33.7 ± 0.7 mV and -41.7 ± 0.4 mV respectively. After the incubation period in mouth phase, the magnitude of the negative charge was reduced in emulsions containing both WPI and pectin, yet it was observed that the ζ -potential of the whey protein isolate stabilized emulsion was increased. A considerable change in the ζ -potential of the emulsion were observed after 2h of incubation period in the stomach phase. In the case of the whey protein isolate stabilized emulsions, the ζ -potential became more positive (18.80 ± 1.05 mV) than the emulsion which contained both whey protein isolate and pectin (3.08 ± 2.46 mV). In the simulated intestinal stage, the magnitude of the ζ -potential was observed to be more negative. The study revealed that whey protein and pectin interactions can enhance the stability of double emulsion in order entrap hydrophilic bioactive compounds.

Keywords

W/O/W emulsion, protein-polysaccharide interaction, stability, folic acid, in vitro behavior

#21: Box-Behnken Design Based Mango (*Mangifera indica*) Wine Preparation, Screening of Phytochemicals and Antioxidant Activity by DPPH Radical Scavenging Assay

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Preparation of mango wine was optimized by Box-Behnken design. Variable factors were water to mango pulp ratio, yeast concentration and sugar concentration. Based on ANOVA analysis, $R^2 > 0.94$ and $P < 0.05$, the optimum conditions were water to mango pulp ratio (2:1), yeast concentration 2.5 g/L and initial sugar concentration 22%. The mean values of alcohol content, pH and total soluble solids were 7.4%, 3.91 and 7 (°Bx). The obtained wine was screened for phytochemicals (bioactive substances) such as alkaloids, carbohydrate, glycosides, phenolic compounds, α -amino acids, saponins, tannin, flavonoids, steroids, terpenoids, reducing sugar, starch and cyanogenic glycosides. Most of the phytochemicals were present in mango wine except saponin, tannin and cyanogenic glycosides. Then the antioxidant property was investigated with 2, 2-diphenyl-2-picrylhydrazyl (DPPH) scavenging assay in vitro. IC_{50} was calculated and the value was < 50 ppm. The above findings showed that the mango wine prepared by using Box-Behnken design had bioactive compounds and antioxidant properties which gave medicinal values.

Keywords

ANOVA, Antioxidant, Box-Behnken design, DPPH

Acknowledgements

Department of Chemical Engineering, YTU and DCPT lab for providing facilities required for this experiment.

#22: Investigation of Phytochemicals, Antioxidants and Antimicrobial Activities in Sacha Inchi (*Plukenetia volubilis*) Press Cake of Myanmar Origin

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Bioactive substances in Sacha inchi (*Plukenetia volubilis*) Press Cake (powder, methanol, ethanol) extracts were investigated against with six clinically important organisms, namely *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus pumilus*, *Candida albican* and *E. coli* performed by Agar Plate Diffusion Method. The antimicrobial study showed that the extracts of press cake sample can inhibit the tested organisms to some extent. From the screening tests, phytochemicals such as alkaloids, glycosides, phenolic compounds, saponins and amino acids contain in the press cake sample, except starch and cyanogenic glycosides which were totally absent in it. The content of total phenolics extracted from press cake was found as 15.4 μ mol of gallic acid equivalents per gram of dried press cake. Determination of total antioxidant activity was carried out by the assay method of DPPH and the resulting data, 8.51 mgAA was observed. These experimental data demonstrate that Sacha inchi Press Cake present in Myanmar is one of the potential plant for therapeutic use and provide health benefits for human.

Keywords

Antimicrobial, antioxidant, Agar Plate Diffusion Method, cyanogenic glycoside, DPPH, gallic acid equivalent

Acknowledgements

Department of Chemical Engineering, YTU
Unicon Sacha Inchi Production Factory

#25: Optimization of Lactic Acid Production from Fermentation of Vegetable Wastes through Response Surface Method

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This study introduces to a process for the fermentative production of lactic acid from vegetable wastes (cabbage and cauliflower leaves wastes) by using indigenous microorganisms. Cabbage and cauliflower leaves are rich carbohydrate and nitrogen source vegetable, so they are suitable as a cheaper source of raw material for the production of lactic acid. The wastes contained about (w/w) 90% moisture, 4% carbohydrate, 2% reducing sugar and 1% protein. Optimization, quantification and kinetic parameter were evaluated for lactic acid production during anaerobic digestion of vegetable waste using salts through Box-Behnken design (BBD) of Response Surface Method (RSM). RSM was used to investigate the effects of four fermentative variable parameters: waste to water ratio (1:0 to 1:2), salt concentration (1% to 5%), initial pH control (6 to 8) and fermentation Period (1day to 5days) on the concentration of lactic acid. Outcomes revealed a relationship between lactic acid concentration and waste to water ratio, salt concentration and fermentation period. RSM was found to be useful in optimizing and determining the interactions among process variables in lactic acid production by fermentation with salt.

Keywords

Lactic acid, Vegetable wastes, fermentation, optimization, Response Surface Method

Acknowledgements

Department of Chemical Engineering, YTU
FIDSL Lab of Myanmar Food Processors and Exporters Association (MFPEA)

#28: Biotechnological Applications in Sustainable Utilization of Seafood Waste: A Review

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A huge amount of organic waste is produced from the seafood products including waste water and solid waste. It has been creating a major threat in sustainable utilization of natural sources like land, water etc. In seafood industry, it is estimated that only 25-50% of the raw material of captured seafood is utilized for primary product and the remaining 50-75% of the raw material is considered as a waste or used for low valued products. The preferable technologies for seafood waste management has been developed but the use of these technologies remain limited. The major component of seafood waste consists of head, gut, skin, shells, bones etc. which are the rich source of essential amino acids. They become a source of isolation of many bioactive compounds to produce functional foods and fulfil the protein requirement in food and animal feed. These all organic inedible seafood waste should be treated to produce edible or inedible useful substances rather than just disposal. According to isolation technology, many valuable substances in waste can eliminate social environmental problems if they are separated and recycled. The most important applications of treated seafood waste are animal feed, chitosan, natural pigments, cosmetics and food. Chitin is a most available natural polymer extracted from crustacean shells cost efficiently. The most important derivative of chitin is chitosan, shows properties of biodegradable, antigenic, antibacterial and edible which can be utilized in wide range of edible and non-edible products. The available information pertaining to the biotechnological applications in utilization of seafood waste has been reviewed in this paper.

Keywords

Seafood, fish waste, biotechnological applications

#29: Recovery and Functional Properties of Muscle Proteins Extracted from Indian Threadfin Bream (*Nemipterus Japonicus*) by pH-Shift Processing

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The pH-shift processing involves the process of solubilisation of muscle proteins at high alkaline pH (11.0) and/or low acidic pH (3.0) followed by precipitation at pH (5.5) of isoelectric point. This method was used for the preparation of surimi from fish mince of Indian threadfin bream (*Nemipterus japonicus*). The study demonstrated the biochemical and functional properties of surimi prepared by acid and alkaline solubilisation. The protein recovery by alkali (76.12%) solubilisation gave better yield as compared to acid (58%). With regard to the proximate composition, highest moisture content was observed in acid surimi, highest protein was observed in alkaline surimi. Lipid and ash content were low in both the surimi samples. The protein solubility and total sulfhydryl groups were highest in alkali followed by acid surimi. The gel strength (232.34 g.cm) and whiteness of alkali surimi was observed to be significantly higher than the acid surimi. The highest expressible moisture was found in acid (7.82%) surimi, followed by alkaline (6.92%). SDS-PAGE of proteins of both the surimi samples showed band intensity of MHC at 200 kDa and actin at 45 kDa which were unaffected by pH solubilisation. The functional characteristics of alkali solubilized surimi gave better results than acid solubilized surimi by pH – shift processing.

Keywords

Pink perch, Surimi, pH-shift processing, functional properties

#33: Effect of Growing Culture on Growth Characteristics of *Acetobacter Pasteurianus* NH6 and their Survival after Heat-Pump Drying

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Used as starter cultures, *Acetobacter pasteurianus* NH6 isolated from fermentation of cocoa beans, were cultured in different media and subjected to heat-pump drying. The study aimed to determine the effect of the growing cultures (comprised of AAM medium, potato extract, coconut water and cocoa pulp juice) on the growth characteristics of the studied bacteria. Screening of different carrier agents (maltodextrin, starch acetate, corn and soybean flours) subjected to heat-pump drying of *Acetobacter Pasteurianus* NH6 has been performed. The results showed that the medium contained 50% of cocoa pulp juice, 0.5% yeast extract, 0.3% peptone, 0.5% ethanol and distilled water was suitable for the *Acetobacter Pasteurianus* NH6 grown at 30°C, pH 5.0 - 5.5 and shaking at 150 rpm in 48 hours. A mixture of corn and soybean flours (4:1, w/w) was confirmed as a carrier agent during heat-pump drying at 45 °C in 5.1 hours. A drying recovery of 99.07% was found with a survival rate of *Acetobacter pasteurianus* NH6 at 77.64%. The viability of these bacteria in the product of heat-pump drying was obtained at 8.43 log CFU/g.

Keywords

Acetobacter pasteurianus NH6, growing media, heat-pump drying, carrier agent, survival rate

#34: Studies on Traditional Making Process, Compositional Analysis and Microbial Population of Myanmar Traditional Fermented Tea Leaves (*Laphet*)

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The traditional fermented tea leaves, *Laphet*, is being consumed as a popular food in Myanmar over the centuries. It is consumed not only as a side dish, it is also as a main dish on the table. In some occasion, *Laphet* is being offered as a meaning of peace. As a fermented product of Tea Leaves, *Laphet* is being popular around the world in recent year. Tea leaves including young leaves and the leaf-buds of the tea plant are used for making Myanmar *Laphet*. Myanmar *Laphet* is prepared with fermentation process, after blanching, then removing the remaining water, rolling to twist the leaves, and finally pressing them by heavy weights. It is done by natural fermentation process. Fermentation process completes after two months with full flavour and taste. As an initial study, the making process of *Laphet* is studied in the Southern Shan state of Myanmar. And then, the Compositional analysis such as; moisture - 70.10%, ash - 1.32%, crude fibre - 3.02%, crude protein - 5.53%, and caffeine - 0.43%, and Microbial population such as; Total Plate Count (TPC), Yeast and Mould count (commercial and Lab-prepared) were examined by standard methods. As part of the main task, this work was done preliminary and from those result detailed of fermentation process can be further studied for the development of Myanmar Traditional *Laphet* processing.

Keywords

Compositional Analysis, *Laphet*, Microbial population, Tea, Traditional Fermentation Method

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#35: Studies on Doxycycline Degradation Fraction in Milk Curd and Whey by Plant Rennet

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Doxycycline, belonging to the Tetracyclines is a broad-spectrum antimicrobial agent which is widely used in preventing and treating infectious diseases in the farm of food-producing animals. This extensive use can lead to an increase in their residues levels in food of animal origins. The main purpose of this work is to study the degradation of doxycycline during the production process of milk curd and whey, using plant rennet. In this paper, the doxycycline spiked milk was processed with traditional method to produce curd using *C. gigantea* (Ma-yo-gyi) leaves and latex. The percent degradation was analyzed using high performance liquid chromatography (HPLC) with ultraviolet detection and gradient elution. According to the above analysis, the percent reduction due to proteolytic enzymes in different plant sources was found to be about 50-70%. The degradation fraction due to leaves and latex in whey was about 11-13% and curd was about 20-40%. Results in the present study showed that the fraction in the curd was more than in whey due to protein binding capacity of doxycycline and the casein hydrolysis activity of proteolytic enzyme in leaves and latex. The latex has higher milk coagulation activity than leaves. The heat and enzymatic activity during curdling is one of the technical aspects of doxycycline degradation in residues reduction for safer food consumption.

Keywords

C. gigantea, doxycycline, HPLC, milk curd, whey

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#36: Determination of Total Fat and Iodine Value in Glutinous Rice-Based Oily Snacks (Htoe Mont)

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Most of Myanmar traditional foods are based on rice and glutinous rice. One of the popular traditional foods is *Htoe Mont* which is the product of Mandalay region (Upper Myanmar). This study aims to determine the total fat content of Fried Coconut *Htoe Mont* which was made of glutinous rice, sugar, peanut oil, peanut and coconut; its results were shown various percentages between 6% and 16.9% of total fat content and Fruits *Htoe Mont* which was made of glutinous rice, sugar, peanut oil, peanut, coconut, raisin and cashew nut were included; its total fat contents were shown as 2.5%-11.7%. The results of plane *Htoe Mont* (after removed ingredients from *Htoe Mont*) were shown that constant result was approximately 2.00 %. This study was done on fat extract in these samples which are determined by Soxhlet Extraction Method. Then, the iodine value (IV) of oils in *Htoe Mont* which were collected five types of brand was determined. Determination of iodine value was analysed by Wiji's Method. This study showed that the total fat content of *Htoe Mont* depend on different ingredients and weight of ingredients, oil in various brands of *Htoe Mont* were peanut oil as results.

Keywords

Fats, Snacks, *Htoe Mont*, Iodine Value, Soxhlet

#37: Effect of Milling on Arsenic Contents in Long-Grain Rice

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Arsenic is a toxic metal that is naturally distributed in soil and water. Rice can absorb arsenic much more effectively than other grains. Brown rice usually contains arsenic at higher level than polished rice. This study aimed to determine the effect of milling on arsenic contents in long-grain rice. The different varieties of rice samples were milled using a laboratory-scale milling machine with weight lever 1400 g at 5, 10, 20, 30 and 60 seconds. Arsenic contents in rice grain before and after milling were determined using Inductively Coupled Plasma-Mass Spectrometry. The results showed that arsenic contents in five varieties of long-grain rice decreased with increasing the degree of milling. Arsenic contents in rice samples were reduced about 20-30% after removing 6% of bran from brown rice and about 30-40% after removing 9-10% of bran from brown rice. The findings were in agreement with arsenic contents found in rice bran samples. The rice bran samples contained higher arsenic levels than those of polished rice and brown rice. Thus, rice bran should not be used for production of everyday consumed foods since it may pose risk of high exposure to arsenic in consumers who eat the products heavily and regularly.

Keywords

arsenic, brown rice, polished rice, milling

Acknowledgements

The study was funded by Thailand National Research Council and Agricultural Research Development Agency.

#38: Effect of Boiling on Arsenic Contents and Antioxidant Activity in Thai Rice Noodle Product Incorporating Pigmented Broken Rice and Rice Bran

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Rice bran of pigmented rice is used for enrichment of healthy foods, due to its high antioxidant compounds. Development of Thai rice noodle (Khanom-jeen) incorporating pigmented broken rice and rice bran is one of the effective ways to add value to rice by-products. However, rice bran also contains high levels of arsenic. This study aimed to investigate the effect of boiling on arsenic contents and antioxidant activity of Khanom-jeen incorporating pigmented broken rice and rice bran. Three formulations of Khanom-jeen were prepared from mixture of pigmented rice flour with 0, 5 and 20% of pigmented rice bran. Arsenic contents in both raw and cooked samples were determined by Inductively Coupled Plasma - Mass Spectrometry. Antioxidant activity of the samples were measured by 2,2-Diphenyl-1-picrylhydrazyl radical scavenging capacity assay. The results indicated that arsenic contents and antioxidant activity of the raw rice flour samples increased with increasing amount of rice bran. After boiling, arsenic contents in Khanom-jeen samples with 0, 5 and 20% of pigmented rice bran were reduced by 34, 39 and 40%, respectively, while antioxidant activity decreased by 63, 59 and 93%. Boiling method could be reduced arsenic contents in the finished rice noodle products. Nevertheless, it also decreased antioxidant activity in the products.

Keywords

arsenic, rice bran, Thai rice noodle, antioxidant activity

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#40: Inadequate intake of Dietary Fiber, Vitamin B₁₂, and Calcium in Thai Elders

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Objective: This study aimed to investigate adequacy of dietary fiber, vitamin B₁₂, and calcium intakes in Thai older adults. **Design:** This observational study used cross-sectional design. **Setting:** Data were collected at Institute of Nutrition, Mahidol University, Thailand. **Participants:** Ninety Thai healthy older adults aged 51-79 years old were recruited. **Measurements:** Dietary fiber, vitamin B₁₂, and calcium intake were assessed by 4 days diet record. Adequacy of nutrient intakes were analysed and compared with the Thai Dietary Reference Intake (Thai DRI) by using INMUCAL. Frequency of green leaves consumption, meat group, and milk and dairy product intake were measured by using food frequency questionnaire (FFQ). **Results:** Up to 90% of participants had inadequate intake of dietary fibers (< 25 g/day). Consistently, up to 55% of participants consumed green leaf and yellow vegetables only once a week. While up to 20% of participants did not consume vegetables at all. Furthermore, inadequate calcium intake (<70% DRI) was found in 90% of participants. Likewise, there were over 70% of participants having inadequate intake of vitamin B₁₂. Consistently, up to 30% of participants consumed milk or meat only once a week. While up to 40% did not consume milk or meat at all. **Conclusion:** our findings suggested that most Thai older adults inadequately consumed dietary fiber, vitamin B₁₂ and calcium. Development of food product for elderly should consider fortification of these nutrients.

Keywords

dietary fiber, vitamin B₁₂, calcium, older adults

Acknowledgements

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#41: Identification of Bacteria Isolated from the Surface in Poultry Process Plant

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Processing equipment and environment are considered to be major concerns of microbial harbourage particular in poultry processing industry. Products could potentially be susceptible to cross-contamination during processing and handling, or post contaminate after cook processing. This research focused on microbial population adhered to the equipment surfaces and environment in poultry processing plant at Lopburi province. The observation was focused on 9 different locations then the samples were collected at 1, 3, 5, 7, 9 and 11 weeks. The population of microorganism adhered on the surfaces were enumerated by using swab test, then enumerated bacteria count by spread plate technique and identify the unknown culture by Matrix Assisted Laser Desorption Ionization Time-Of-Flight (MALDI-TOF). Recent publications have evaluated MALDI-TOF in microbiology laboratory for routine use as a rapid, precise, and cost-effective method for identification of intact bacteria. The total plate count indicated that biofilm might form at some locations; niches, wet area or unclean surfaces, that microbial growth over 4 log CFU/cm² after five weeks. The highest viable bacterial population was found in the drainage. Obtained results showed that *Achromobacter* sp. (44 %) are highest bacteria that found on the surface. *Pseudomonadaceae* (34 %), *Pseudomonas aeruginosa* were found 20% of these group. So, it can form biofilm on the surface. *Staphylococcaceae* (5 %), *Staphylococcus aureus* and *Staphylococcus epidermidis* were the most frequently detected pathogens, *Enterobacteriaceae* (3 %) such as *Escherichia coli* were identified as major family that can cause spoilage and possible to risk of foodborne pathogen contamination. This study supports MALDI-TOF MS being a reliable tool for the identification of microbial and present new data. The industry can create a cleaning program for decreasing bacteria on the surfaces that over the standard.

Keywords

bacteria, biofilm, Food safety, MALDI-TOF, Poultry process

Acknowledgements

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#42: Impact Assessment of Fiber Rich Supplement on Blood Glucose Level of Diabetic Subjects

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An investigation was undertaken to develop a fiber rich supplement and to assess its effect on blood glucose level of type 2 diabetic patients. By using locally available foods fiber rich supplement was developed. It was tested on eleven type 2 diabetic subjects for blood glucose lowering effect by undertaking an intervention of two months feeding trials. The findings of the study revealed that the developed fiber rich supplement was accepted by panel members, was having 58.65 per cent total dietary fiber and 36.14 glycemic index. Results with respect to two months supplementation indicated that the fiber rich supplement was helpful in significantly reducing the fasting and postprandial blood glucose level of subjects. The reduction in the fasting blood glucose level after two months supplement intake was 30-70 mg/dl. While, the postprandial blood glucose values of the subjects were reduced by 92-140 mg/dl. There was reduction in the physiological symptoms at the end of the supplementation. It can be concluded from the study that the developed fiber rich supplement had therapeutic value as it was beneficial for lowering the blood glucose content of type 2 diabetics.

Keywords

Fiber Supplement, Type 2 Diabetes, medicinal food

#47: Prevention of Browning Formation in Fresh-Cut Cabbage

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Fresh-cut cabbage has a short shelf-life during the postharvest storage at chilling temperature due to its susceptible to an enzymatic browning reaction. Thus, the objective of this study was to investigate the effects of a calcium chloride combined with an ascorbic acid or a citric acid on retarding the browning formation in fresh-cut cabbage during storage. Two lots of green cabbages were purchased from a wholesale market in Nakhon Pathom, Thailand. After that, they were removed the loose outermost leaves and washed under the running tap water. Then they were shredded into small pieces with an approximately thickness of 0.5 cm. The shredded cabbages were divided into four groups according four different solutions including water, 0.5% calcium chloride, 0.5% calcium chloride with 0.5% ascorbic acid and 0.5% calcium chloride with 0.5% citric acid. They were dipped in solutions for 10 min. at an ambient temperature. In addition, Tsunami 100™ was added to all solutions with a concentration of 30 ppm of peroxyacetic acid for sanitization. Dewatering was done prior to packing the samples in a polyethylene box sealed with a LDPE film. Each box contained 150 g of samples. Three boxes were prepared for each treatment. The experiments were performed in duplicate. Samples were kept in a refrigerator (6 ± 2 °C and $93 \pm 7\%$ relative humidity) for ten days. Browning index and colour values (L^* , a^* , b^* and ΔE) were measured at 0, 2, 4, 6, 8 and 10 days of storage, while samples at 0, 4, 8 and 10 days of storage were taken to total viable count, yeast and mould determinations. It was found that shredded cabbages dipped in a solution of 0.5% calcium chloride with 0.5% citric acid had a better quality in terms of colour and retarding browning formation during storage compared to those of other treatments. Concerning the standard of total viable count, yeast and mould for fresh-cut fruits and vegetables, the shredded cabbages dipped in a solution of 0.5% calcium chloride with 0.5% citric acid can be kept at a refrigerator for 8 days.

Keywords

ready to eat cabbage, browning reaction, minimally processed, passive MAP

Acknowledgements

This work is a part of the project “Formulation of Mixed Anti-Browning Agents for Fresh-cut, vegetable and Cut Flower to Potential Commercialization under the frame work of “Improvement the Efficiency of Browning Inhibition in Fresh-cut Fruit, Vegetable and Cut Flower” funded by Silpakorn University Research and Development Institute (Thailand’s Budget 2017).

#48: Jamara as an Innovative Food Ingredient: A Review

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The demand from global health conscious consumers have attracted the food industries to seek a more natural way of supplementation of micro-nutrients and health promoting factors in food with clean label. Recent technological innovations have led to the production of many innovative health food ingredients like Jamara, for the supplementation of specific micronutrients and functionalities, reduction or removal of undesirable food components and synthetic emulsifiers/stabilizers, and modification of food compositions and sensory attributes. Jamara are young plants traditionally grown by etiolation for six days and exposure to diurnal light until the fifteenth day, in Nepal. In contrast to other production methods of cereal and legumes young plants (grass), the chlorophyll synthesis and photosynthesis occurs only after the illumination on seventh day in Jamara. Jamara are therefore metabolically very active, along with the uptake of nutrients and synthesis of a series of enzymes and related metabolites. The richness in vitamins, pro-vitamins, chlorophyll, amino acids, minerals, enzymes, phenolics and total anti-oxidants makes Jamara powder a potential innovative food supplementing ingredient in terms of micro-nutrients and health promoting factors. A substantial proportion of Jamara comprises of a variety of amino acids and proteins, indicating its potential functionalities in liquid food systems. In depth research and innovation of optimal horticultural and post-harvest procedure is however required before commercial production and use.

#50: POSTHARVEST project: Best Innovative Approach to Minimize Postharvest Losses within Food Chain for VET

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The POSTHARVEST project “*Best Innovative Approach to Minimize Post Harvest Losses within Food Chain for VET*” is funded by the Erasmus+ Program of the European Union in the field of Strategic Partnership for vocational education and training and aims to bring an innovative approach to Vocational Education and Training (VET) in the postharvest sectors. The project focuses on four different fruit (tomatoes, figs, grapes and cherries) and its target groups are mainly farmers, wholesalers, transporters, retailers, specialists, VET trainers and policy makers.

After a needs assessment survey on postharvest losses in the fresh fruit and vegetable sector, the potential causes of food waste among the project partner countries have been identified. An extended report showing the current situation in relation to the training needs of the sector employees has been produced and is publicly available on the project’s website (<http://www.postharvestproject.com>). Following the results of the survey, two out of six training materials have been already developed and are available in five languages (English, German, Spanish, Romanian, Turkish). The “*Training Material on Sales Conditions in Retail and Wholesale Market*” is expected to enhance the vocational qualifications of the staff working in the fresh fruit and vegetable retail and wholesale markets. The “*Training Material on Food Losses Valorisation Applications*” is expected to broaden the knowledge of the staff working in the postharvest sector explaining various techniques of food waste recovery and demonstrating some uses of by-products. Moreover, seminars and training activities are organised throughout the project intending to increase awareness and strengthen the expertise of the target groups in the postharvest sectors.

Postharvest food loss is a challenge for all countries nowadays and the project’s outputs are expected to offer new insights to this issue.

Keywords

Postharvest, food loss, VET, training, waste management

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#51: Ultrasound-Assisted Extraction and Quality Characteristics of Passion Fruit Seed Oil (*Passiflora edulis* Sims Var. *edulis*)

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The purple passion fruit (*Passiflora edulis* Sims var. *edulis*) is mainly grown for fresh and concentrated juice production in Vietnam. The industrial production of passion fruit juices produces large amounts of by-products including seeds and peels that account up to 60% total fruit weight (Silva *et al.*, 2015). While passion fruit seed discharged each year leads to an increasing environmental problem, its high lipid content, around 30% (Oliveira *et al.*, 2014; Silva *et al.*, 2015), can be employed in food and cosmetic industries (Oliveira *et al.*, 2013). The objectives of this work were: (i) to investigate the effects of process variables on the oil extraction from passion fruit seeds by ultrasound-assisted extraction technique using non-conventional solvent (acetone, ethanol, ethyl acetate, and isopropanol) with a conventional solvent (hexane) and reported an extraction process for passion fruit seed oil which is accepted in food grade; and (ii) to determine the quality characteristics of passion seed oil obtained from purple passion fruit variety commonly grown in Vietnam. This study was then the first step of exploitation of passion seeds as an additional dietary source of essential polysaturated fatty acid (PUFA). The highest yield of passion fruit seed oil was 76.84% which was obtained using ethyl acetate with material to solvent ratio of 1/10 at temperature 40°C in 15 minutes and equally the yield from employing hexane as a solvent. Our results indicate that ethyl acetate can greatly replace the conventional solvent in extraction oil from passion fruit seed. High content of the PUFA of passion fruit seed oil suggests this product has good potential for use in human food and cosmetic industry.

#52: Selection, Identification of Lactic Acid Bacteria Producing Cold Active β -Galactosidase for Enzyme Hydrolysis of Lactose in Fresh Milk

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In this study, 200 strains of lactic acid bacteria isolated from soil of different cow farms, cold storage Bavi fresh milk, fermented milk were used to screen strains of interest producing β -galactosidase on agar plate supplemented Xgal. The result indicated that 21 strains produced β -galactosidase, in which 6 strains (SDA3, SPD2.3, SPD3.3, SC3, SC4, SC5) with heavy blue color were used to determine enzyme activity. β -galactosidase of SC3 strain with highest activity 388.7 U/l was tested cold active activity, stability and lactose hydrolysis in fresh milk. Relative activity of enzyme at 4°C and 30°C was 24.36%, and after 24 days of incubation at 4°C, enzyme activity was still remained 55.02%. Analysis result of lactose hydrolysis in fresh milk by using HPLC system with RID detector showed that ratio of 15 ml fresh milk and 5 ml enzyme (0.017 U/ml) was the best in terms of lactose hydrolysis, after 27h of enzyme incubation, lactose content in fresh milk was reduced to 39.89%. The strain SC3 was identified to be *Streptococcus thermophilus* based on the comparison of sequence encoding for 16rRNA gene. In conclusion, β -galactosidase from *Streptococcus thermophilus* SC3 is promising for lactose hydrolysis of fresh milk at cold storage condition before application of enzyme in production of lactose free milk.

Keywords

Lactic acid bacteria, β -galactosidase, cold active β -galactosidase

#53: Antioxidative Activity of Tea Polyphenols Extract in Palm Oil

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Tea polyphenol extracts (TPE) (94,08% dry mater (DM) total polyphenols, 71.14% DM total catechins) at three concentrations (100 ppm, 200 ppm and 400 ppm) were examined in palm oil in accelerated oxidation conditions at 60⁰C. A sample without antioxidants and a sample with 100 ppm butylated hydroxyanisole (BHA) + 100 ppm butylated hydroxytoluene (BHT) were used as the negative and positive controls, respectively. The result showed that TPE was capable of the maintenance of the sensorial properties palm oil during storage. The peroxide values of oil at the 200 ppm of TPE added after 12 days of accelerated oxidation were 13.2 folds and 8.9 folds lower than the corresponding negative and positive controls. These values were 2.8 folds and 2.0 folds lower than respectively with diens and 3.3 folds and 2.1 folds respectively in the case of p-anisidine. Concerning to the TPE concentration, 200 ppm of TPE was suitable to stabilize the palm oil quality during storage.

Keywords

Tea polyphenol extract, antioxidative activity, palm oil quality

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