CIFST ICSTA

Canadian Institute of Food Science & Technology

Institut canadien de science & technologie alimentaires

2018 NATIONAL CONFERENCE

POSTER ABSTRACTS
Tuesday, May 29, 2018
DAY 2

Food for Health, Consumer Trends and Food Safety

[33] MAA PROFILES & ANTIPROLIFERATIVE ACTIVITIES OF EDIBLE RED SEAWEEDS

Yvonne V. Yuan
School of Nutrition, Ryerson University, Toronto, ON

The mycosporine-like amino acid (MAA) profiles, reducing activity, oxygen radical absorbance capacity (ORAC) and antiproliferative activities of methanol extracts of wild-harvested (Chondrus crispus, Mastocarpus stellatus, Palmaria palmata) and cultivated edible red seaweeds (Chondracanthus chamissoi, Fredericqia deveauniensis, Sarcodiotheca gaudichaudii) were determined in the present study. MAAs confirmed by LC/MS/MS in extracts were: palythine, asterina-330, shinorine, palythinol, porphyra-334 and usujirene. Extract reducing activities were: P. palmata > F. deveauniensis ≥ S. gaudichaudii Parent = M. stellatus = S. gaudichaudii Variant = C. chamissoi > C. crispus; and ORAC values were: M. stellatus > P. palmata > F. deveauniensis > C. crispus > S. gaudichaudii Variant = S. gaudichaudii Parent = C. chamissoi. HeLa and Caco-2 cell proliferation were inhibited ($p < 0.001$) in a dose- and species-dependent manner by extracts from 0.125-4 mg/mL, 72 hrs. Extracts containing low-polarity usujirene and polar shinorine were particularly antiproliferative. Others rich in polar palythine and asterina-330 also exhibited strong antiproliferation. This work will be instrumental in furthering the development of Atlantic Canadian mariculture producers and processors of edible marine red seaweeds in the processed and functional food industries.

[34] BIOACCESSIBILITY OF NUTRIENTS AND BIOACTIVE COMPOUNDS WITH DIPEPTIDYL PEPTIDASE-IV AND A-GLUCOSIDASE INHIBITORY ACTIVITIES IN PULSES

Di Stefano Elisa[1,2], Teresa Oliviero[2] and Chibuike Udenigwe[1]
[1]*University of Ottawa, Ottawa, ON*
[2]*Wageningen University and Research, The Netherlands*

Type 2 diabetes is one of the fastest growing diseases in Canada and worldwide. Dipeptidyl peptidase (DPP)-IV and α-glucosidase are enzymes that play a central role in post-prandial glucose regulation in humans and are established targets for antidiabetic drugs. Plant-derived DPP-IV and α-glucosidase inhibitors have been reported, but the effect of food matrix on the bioaccessibility and bioavailability of these compounds remains unclear. In this study, DPP-IV and α-glucosidase inhibitory activity of five widely consumed pulses (kidney bean, chickpea, fava bean, yellow pea, green lentil) was investigated. The effect of germination, microbial fermentation, heat treatment, mechanical disruption, and a combination of these treatments, were evaluated in relation to pulse nutrients digestibility and bioaccessibility after in vitro gastrointestinal digestion, and for their effect in modulating the release of bioactives with DPP-IV and α-glucosidase inhibitory activities. Increase in germination time up to 5 days corresponded with increase in protein digestibility before simulated gastrointestinal digestion but did not influence bioaccessibility of the proteins. Interestingly, physical pre-treatment of the pulses (grinding, soaking) and solid-state fermentation significantly increased the digestibility of pulses compared to thermal treatment, but the thermal treatment provided significantly higher values for bioaccessibility of proteins. Overall, germination, and a combination of grinding and fermentation, were the most efficient pre-treatments in increasing digestibility of pulses before simulated gastro-intestinal digestion, while thermal pre-treatment provided the highest bioaccessibility of the same nutrients. This study highlights the importance of considering bioaccessibility as a key factor when determining the nutritional value of pulses and has the potential to provide processing methods that enhance the content of bioactive compounds in pulse-derived foods.

[35] BIODEGRADABLE FILM PACKAGING FROM AMAZON TUMERIC STARCH

Polyanna Silveira Homung, and Trust Beta
Department of Food and Human Nutritional Sciences, University of Manitoba, Winnipeg, MB

It is evermore imperative to develop green processes and products due to the environmental and health problems facing modern society. Biodegradable starch packaging which also has antioxidant and antimicrobial properties, lowers the levels of additives incorporated in foods and undergo rapidly degradation when package is discarded. The Amazon turmeric starch (*Curcuma longa* L.) is widely cultivated and easily obtained. Its main use is to extract oleoresin for pigments (curcuminoids, 2-8%) and the byproduct, starch representing 85% of the initial matter has no commercial value. Thus, the aim of this study was to use HPLC-MS to identify and quantify the phenolic compounds in Amazon Curcuma longa L. starch; to develop a bioactive starch film, and to characterize its phenolic compounds (HPLC-MS/ Folin-Ciocalteu) and antioxidant capacity (DPPH, ABTS, and ORAC); as well its thickness and granular structure (SEM), mechanical (tensile strength and elongation at break) and colour (CIE-lab scale: L*, a*, b*) properties. HPLC-MS revealed eight major phenolic compounds in the C. longa starch and six in its film. The starch and the film from C. longa had high levels of antioxidant capacity, 65 – 92% (as measured by DPPH and ABTS). Furthermore, C. longa exhibited a smooth structural surface and strong resistance to tensile force, as well as maintaining its elasticity as measured by mechanical assays (tensile strength and elongation at break). Based on the above results, a novel biodegradable starch film was obtained applying a single matrix, the Amazon *Curcuma longa L*. starch.

[36] DEVELOPMENT OF BAKERY PRODUCTS MEETING THE FLAX HEALTH CLAIM

Lisa Casper
Food Development Centre, Portage La Prairie, Manitoba, MB

In 2014, Health Canada introduced a health claim for cholesterol reduction associated with daily consumption of 40g of whole, milled flaxseed (product must contain at least 13g per serving and per reference amount). This quantity exceeds typical industry usage levels. To assess the feasibility of incorporating high flaxseed levels and to facilitate industry to dev+elopment food products using whole, milled flaxseed, the Flax Council of Canada commissioned research to develop bakery products satisfying the health claim. Brown flaxseed was chosen over golden flaxseed because of its widespread commercial availability and more challenging colour. Formula and process modifications required for successful incorporation of a high level of whole, milled flaxseed were identified. The formulations & process were scaled to 20kg (muffin) and 33kg (bread) batches and were also converted to consumer recipes. It was possible to produce high quality milled flaxseed muffins and bread satisfying all health claim requirements.

[37] ACCEPTABILITY OF FORTIFIED COMPLEMENTARY FOODS IN LAO CAI, VIETNAM

Yvonne V. Yuan[1], Cecilia Rocha[1], Bao Hoa Do[2], Matthew Brown[2], Phuong Huynh[2], and Huy Nguyen[2]
[1]School of Nutrition, Ryerson University, Toronto, ON
[2]National Institute of Nutrition, Ha Noi, Việt Nam

In rural northern Vietnam, childhood stunting rates are 15 - 27.5%. In Lao Cai province, female subsistence farmers grow crops, but face barriers sending produce to markets. The present intervention purchases these crops which are processed in local small-scale food processing facilities (SSFPF) to produce instant fortified complementary foods (FCF) for weaning. This project leverages the experience of the National Institute of Nutrition of Vietnam to ensure HACCP and ISO 22000 standards during manufacture. Locally grown rice was combined with a Zn/Fe premix before extrusion and hammer-milling. Local vegetables such as: "Sweet leaf" (Sauropus androgynous), pumpkin, Shiitake mushrooms (Lentinula edodes) and carrots were dehydrated and hammer-milled. Sensory testing in Lao Cai with parent/caregiver-child pairs (n=126) showed that acceptability of rice milled into a homogeneous particle size was sub-optimal; whereas different particle sizes gave a better texture. The rice with pumpkin FCF scored highest using a 7-point hedonic scale, followed by Shiitake, carrot and "Sweet leaf". A "just-about-right" scale showed high satisfaction among subjects (81-92%) for product consistency, fat content and saltiness. Producing FCF in local SSFPF can assist with nutrition-based interventions with high acceptability, in an effort to improve food security and access to fortified complementary foods for weaning in northern Vietnamese provinces.

[38] NUTRIENT COMPARISONS OF THE EDIBLE PARTS OF MORINGA OLEIFERA

Kiki Chan, Yu-Ling Cheng and Levente Diosady
University of Toronto, Toronto, ON

Moringa oleifera is a tropical plant species that has received growing attention due to its health and nutritive properties. A diverse variety of food products from Moringa powder to Moringa tea are now available in supermarkets and health stores. Leaves and pods are the most commonly eaten parts of M. oleifera and are endorsed for their high micronutrient and protein content, but literature values vary greatly and can affect the accuracy of nutrition claims. Thus, there is a need to compare the nutrient content of M. oleifera from different regions in the world using standardized procedures. This research study examines the nutrient variability of M. oleifera leaves and pods by comparing the mineral and protein content of plant samples from several regions, both experimentally and in literature. Samples of M. oleifera leaves and pods from North India (Delhi), South India (Coimbatore and Chennai) and Nigeria (Lagos) were analyzed for their mineral and protein content using Inductively Coupled Plasma (ICP) and Kjeldahl analysis respectively. Variable results were observed in the mineral content; most notably, the iron content observed in experimental and literature values ranged from 120 to 670ppm. The protein content in Moringa leaves ranged from 22 to 44% amongst experimental and literature values. In summary, M. oleifera is a nutrient dense plant species, however, the variability in mineral and protein content should be considered when making nutrition claims.

[39] FUNCTIONAL AND NUTRITIONAL PROPERTIES OF CISSUS SICYOIDES BERRIES

Andrea Goldson Barnaby
Department of Chemistry, University of the West Indies, Kingston, Jamaica

The consumption of berries is associated with several health benefits. This study was undertaken to evaluate the nutritional and functional properties of Cissus sicyoides berries which are currently underutilized. The free radical scavenging activity and inhibitory concentration (IC50) of the berries was determined utilizing the 2,2-diphenyl-1-picyrlhydrazyl (DPPH) assay. The berries are a source of bioactives exhibiting free radical scavenging activity of 84 % with an IC50 value of 1 mg/mL. The berries could have potential food, beverage and medicinal applications.

[40] OXIDATIVE STABILITY OF FLAXSEED OIL: ANTIOXIDANT SELECTION CRITERIA

Athira Mohanan, Michael Nickerson, and Supratim Ghosh
Department of Food and Bioproduct Sciences, University of Saskatchewan, Saskatoon, SK

Canada is world largest producer of flaxseed oil, a rich source of essential fatty acids and vitamins. However, its high susceptibility towards oxidative deterioration reduces its nutritional quality and shelf life, which limits its utilization. Natural antioxidants can protect FSO from oxidation and improve its nutritional value, but a selection criterion for the antioxidant is unknown. Present study explored the effects of polar (tannic acid), non-polar (alpha tocopherol), and surface active (ascorbyl palmitate) natural antioxidants, which displayed highest DPPH radical scavenging and iron chelating abilities among several others, on the oxidative stability of FSO. A synthetic antioxidant (tert-Butylhydroxyquinone, TBHQ) was also used as a control. FSO oxidation was examined by peroxide and p-anisidine values during long term storage (30 days) at 25, 40 and 60 °C, and by accelerated oxidation testing using a rancimat at 110 °C. All natural antioxidants were less effective than TBHQ. Irrespective of the polarity, all natural antioxidants, except alpha tocopherol, delayed primary and secondary oxidation, and increased the oxidative stability index. The alpha tocopherol displayed pro-oxidant effect at all concentrations. The study revealed that, along with high antioxidant capacities, ability of the antioxidant to replace minor components from the moisture-oil interface and minimal antioxidant-metal interaction were also crucial for the protection of FSO.

[41] NUTRITIONAL COMPOSITION AND ANTIOXIDANT PROPERTIES OF COLOURED COWPEAS

Franklin B. Apea-Bah[1], Kabo Masisi[1], Victoria Ndolo[2], Mangani Katundu[2] and Trust Beta[1]
[1]Department of Food and Human Nutritional Sciences, University of Manitoba, Winnipeg, MB
[2]Chancellor College, Faculty of Science, Department of Human Ecology, University of Malawi, Zomba, Malawi

This research investigated the effects of geographical region and variety on the nutritional composition, phytochemical profile and antioxidant properties of cowpea (Vigna unguiculata) seeds differing in seed coat colour. Three cowpea varieties, comprising a cream, a pink and a purple seed coat-coloured seeds, were used in the study. The seeds were collected from five regions in Northern Malawi namely, Kabanda, Kabwanda, Chimbongondo, Emityani and Mlimo. The nutritional composition determined included crude protein, crude fat, moisture, ash and total carbohydrates by difference, as well as the water-soluble vitamins: thiamine, pyridoxine, nicotinamide, folic acid and riboflavin. The total phenolic content and phenolic acid composition of both the free and bound fractions were determined. Antioxidant properties measured included trolox equivalent antioxidant capacity, oxygen radical absorbance capacity and 2,2'-diphenyl-1-picrylhydrazyl radical scavenging capacity. The crude protein content ranged from 21.4 to 24.6 g/100 g while crude fat content ranged from 1.6 to 2.1 g/100 g. Moisture content ranged between 12 to 14% (w/w) while ash content ranged between 3.4 to 3.9% (w/w). Among the varieties, the cream cowpea type had higher ($p<0.05$) protein content than the pink type, while the purple type was not different from the other two. Also, the cream and pink types had higher ($p<0.05$) water-soluble vitamins content than the purple type. All the cowpea types had higher phenolic content and antioxidant properties in the free fractions than in the bound fractions. This study demonstrates Canada's commitment to collaborating with sub-Saharan Africa in the development of scientific research.

[42] APPLE POMACE SUPPLEMENTATION AFFECTED BONE INDICES IN GROWING RATS

Janet C. Tou and R. Chris Skinner
Human Nutrition and Foods, West Virginia University, Morgantown, WV

Apples are among the most popularly consumed fruits. Processing of apples results in 25% being discarded as waste referred to as apple pomace. Inclusion of skin and seeds in pomace results in higher dietary minerals, polyphenols and pectin compared to whole apples; however, the fructose content is also higher. Preclinical studies reported improved lipid metabolism, antioxidant capacity and digestive health suggest apple pomace's use as a dietary health supplement. Nutrients more highly concentrated in apple pomace also have the potential to impact bone. We determined the effects of apple pomace supplementation on bone health indices. Female Sprague-Dawley rats were randomly assigned (aged 28d) to consume a purified rodent diet (AIN-93G), AIN-93G +10% kcal apple pomace, Western diet (45% fat, 33% sucrose), or Western + 10% kcal apple pomace diets for 8 weeks. Rats fed diets with apple pomace consumed more dietary calcium (Ca) nd had greater Ca absorption ($P<0.05$). Rats fed Western diets had shorter ($P = 0.02$) femurs. However, there were no significant differences in total bone mineral, Ca among diet groups; nor were there differences in bone biomechanical strength determined by three-point bending test between groups. Diets with apple pomace had neither beneficial or detrimental effects on bone in growing rats. Using apple pomace as a nutrient-rich product for human consumption provides an environmental and economical solution to dealing with waste from apple processing.

[43] INCORPORATION OF CEREAL GRAINS AND LEGUMES IN PROBIOTIC YOGURT

Mohammad Soltani, Sharareh Hekmat, and Latifeh Ahmadi
Brescia University College at Western University

There are currently limited studies that have examined the impact of yogurt supplemented with cereal grains and legumes on the growth and survival of Lactobacillus rhamnosus GR-1 over storage period. The objectives of this research were to incorporate L. rhamnosus GR-1 in yogurt samples supplemented with oat (PYO), barley (PYB), quinoa (PYQ), mung bean (PYM) and adzuki bean (PYA) at the rate of 3% (w/v) and to evaluate the sensory properties (n = 100 participants) of the probiotic yogurt samples. Probiotic yogurts supplemented with these grains and legumes showed the survival of L. rhamnosus GR-1 at viable levels of at least 1x108 cfu/mL over the 28 d storage period. There were no significant differences ($P > 0.05$) between samples and the initial mean counts (x108 cfu/mL) of L. rhamnosus GR-1 for PYC, PYB, PYO, PYQ, PYA, and PYM were: 4.18, 4.75, 5.73, 8.25, 1.45 and 3.03, respectively. After 28 d of storage, the mean microbial counts (x108 cfu/mL) were: 2.25, 2.65, 3.85, 4.75, 1.1 and 1.6 respectively. The results of sensory evaluation showed that there is potential to incorporate grains such as oat, barley and adzuki beans in probiotic yogurt. We demonstrated that yogurt samples containing barley, oat, quinoa, adzuki bean and mung bean had no adverse effect on the growth and survival of L. rhamnosus GR-1 as their counts were beyond 108 cfu/mL over a 28 d storage period. Our results indicated that there is potential to incorporate certain grains into probiotic yogurt.

[44] INDIGENOUS YEASTS AND LACTIC ACID BACTERIA FROM NOVA SCOTIA VINEYARDS

Lihua Fan[1], Craig Doucette[1], Tharcisse Barasubiye[2], Renlin Xu[2], and James T. Tambong[2]
[1]*Kentville Research and Development Centre, AAFC, Kentville, NS*
[2]*Ottawa Research and Development Centre, AAFC, Ottawa, ON*

Yeasts and lactic acid bacteria (LAB) on grapes are influenced by regional climatic conditions. Wine quality is strongly impacted by the yeast and LAB involved in the fermentative process. The objective of this study was to isolate, identify and characterize naturally occurring yeasts and LAB to improve wine quality. Grapes from the cultivars L'Acadie, Riesling, New York Muscat, and Pinot Noir grown at multiple vineyard sites in Nova Scotia were collected to isolate yeast and LAB strains. Using commercial kits we extracted total genomic DNA from yeast and LAB cells followed by accurate identification based on DNA sequence analysis. We identified 13 yeast species including Hanseniaspora uvarum, Saccharomyces cerevisiae, Aureobasidium pullulans and Rhodotorula glutinis. The LAB isolates were phylogenetically grouped into five putative genotypes belonging to Lactococcus lactis, Lactobacillus animalis, Pediococcus pentosaceus, Enterococcus mundtii and Enterococcus faecium. Identified yeasts were characterized with respect to sulfur dioxide and ethanol resistance, β-glucosidase activity and hydrogen sulfide production. Based on the results, we have selected the promising yeast strains to be used for wine fermentation. The research results will help create a national yeast and malolactic fermentation (MLF) bacteria bank and database, which will be accessible to grape growers and provide more options for wine makers to define their products in local and international markets.

[45] RAPID PATHOGEN DETECTION TECHNOLOGIES USING PCR

Gaurav Tewari and Sean Peschisolido
Sargent Farms LTD

Food testing has quickly become the beneficiary of emerging technologies from the research and life sciences. Real Time PCR (Polymerase Chain Reaction), quantitative or qualitative PCR (qPCR) are all variations of the same process by which DNA is amplified and bound to a flora fore for detection in real time for quantitative or qualitative detection. As foods become more readily available from sources local and abroad the need for fast local testing of quality indicators, pathogenic bacteria and food fraud are essential to protect our population and public healthcare system. Tradition Microbiological methods like Standard Media Agars (SMA) have evolved to selective chromogenic agars where targeted organisms are supplemented with nutrients and competing organisms are minimized for easy target identification. The TTR (Time to Results) was not address by the shift from SMA, Rapid methods like RT-PCR offer the solution to faster TTR. Rapid method follow standard protocols from sample prep to sample enrichment but rather than streaking a plate with the enriched sample an aliquot is added to the bacteria specific kit, preparation protocol than ran in the RT-PCR Machine to provide negative screening results in under 2 hours. This offers a time savings of at least 24 hours, depending on the organism and offers and increased level of sensitivity! An overview of latest developments in PCR shall be provided with specific emphasis on Salmonella, Campylobacter and Listeria detection.

[46] Application of cold plasma-based hurdle intervention to reduce Salmonella in raw poultry

Shreyak Chaplot[1], Barun Yadav[1], Byeonghwa Jeon[2] and Roopesh M. Syamaladevi[1]
[1]*Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB*
[2]*School of Public Health, University of Alberta, Edmonton, AB*

In Canada, Salmonella related foodborne illness account for more than 88,000 cases annually. Poultry products represent as one of the major carriers of Salmonella. Majority of the current disinfection strategies applied in poultry industry are engrossed on the use of diverse chemical antimicrobial agents; however, very limited knowledge about efficacy of the hurdle interventions is available. Therefore, objective of this study was to evaluate the synergetic effect of cold plasma (CP) and peracetic acid (PAA) as hurdle anti-microbial interventions to reduce Salmonella enterica Typhimurium on fresh poultry. Chicken breast pieces (approx. 2 cm 2) were inoculated with S. Typhimurium suspension (7 log 10 CFU/mL) and were allowed to stand 30 min for bacterial attachment, followed by application of different treatments consisting of cold plasma and PAA (100 and 200 ppm) alone as well as in combination for 6 min each, respectively. Following respective treatments, breast pieces were rinsed, serially diluted and plated onto tryptic soy agar, and incubated micro-aerobically at 37˚C for 24 h. Different hurdle interventions using PAA and CP treatments resulted in significant ($p \leq 0.05$) reduction in S. Typhimurium ranging from 2.3 to 5.3 log CFU/mL in comparison to PAA 100 ppm, PAA 200 ppm and CP treatment alone, which resulted in reduction of Salmonella population by 0.6, 1.3 and 2.3 CFU/mL, respectively. Treatments involving application of PAA followed CP immediately (E3) and CP followed by PAA (E5) resulted in the highest ($p \leq 0.05$) anti-microbial action 4.7 and 5.3 log CFU/mL. Results form this also indicate that, color and weight of chicken breast may be affected with the application of different treatments, hence for large scale application, further research need to be done for optimizing this hurdle intervention. In conclusion, this study demonstrates the synergistic and hurdle effect of cold plasma and peracetic acid for the safety of poultry products. Moreover, it also showcases the potential to reduce the use of chemical based antimicrobial agents which are known to induce potential toxic and carcinogenic effects in humans.

[47] ASSESSMENT OF A SIX SIGMA METHOD TO VERIFY A SANITATION PROCESS IN A FRESH CUT PRODUCE PLAN. A CASE STUDY

Rebecca L. Robertson and David D. Kitts
Faculty of Land and Food Systems, University of British Columbia, Vancouver, BC

Fresh-cut produce plants must be properly cleaned to prevent pathogen contamination on food contact surfaces. In 2016, a company associated with a Listeria outbreak in packaged salads had internal test results indicating sporadic contamination of equipment and the environment for 1½ years. This presentation examines an adapted six sigma metric, defects per opportunity (DPO), to measure the performance of a fresh-cut sanitation process while it is running, a key concept of Hazard Analysis Critical Control Point (HACCP) programs. This approach is different to the current practice of verifying sanitation programs after completion by examining equipment for food residues and microbes. A Defect Opportunity Checklist (DOC), a tool to measure the sanitation process, was developed from company sanitation procedures and best practices for fresh-cut produce sanitation. Herein, we report results of a DOC used to measure the sanitation process over a 7 month. It was observed, from three independent runs, that the defect rate slightly decreased from 37% to 33%. The defects were categorized into a Pareto chart while reasons for the limited defect rate improvement were analyzed and illustrated on a Cause & Effect Diagram. This research is important for the Canadian food processing industry because it provides insights into why a sanitation program can continue to have a significant defect rate, despite using a tool that clearly indicates what is going wrong during the process.

[48] EMOTIONAL RESPONSIVENESS: INDIVIDUAL DIFFERENCES AND FOOD IMPLICATIONS

Margaret Thibodeau[1] and Gary Pickering[1,2,3,4]
[1]*Department of Biological Sciences, Brock University, St. Catharines, Ontario, Canada*
[2]*Cool Climate Oenology and Viticulture Institute, Brock University, St. Catharines, Ontario, Canada*
[3]*Department of Psychology, Brock University, St. Catharines, Ontario, Canada*
[4]*Charles Sturt University, Wagga Wagga, Australia*

Recently, there has been strong interest in characterizing the full experience of consumers when consuming foods and beverages. In addition to determining sensory and hedonic responses, this has involved measuring the emotional responses elicited by food products. To this end, we sought to determine if the emotional responses of consumers varies with thermal taste status; an important source of individual variation in taste perception. Thermal taste status is determined when the tongue is cooled or heated, whereby thermal tasters experience a phantom taste sensation while thermal non-tasters do not. Importantly, thermal tasters experience greater responsiveness to alcoholic beverages and some foods than do thermal non-tasters, but it is unknown if emotional responses mediate these observations. Canadian consumers (n=100) were recruited, had their thermal taste status determined, and completed the Affect Intensity Measure (AIM). The AIM is a 40-item questionnaire used to measure the intensity of a broad range of both positive and negative emotions. A student's t-test ($p[t=2.05] = 0.043$) indicated that thermal tasters (n=58) had significantly higher mean AIM scores (3.93) than thermal non-tasters (n=42 3.71); that is, thermal tasters experience stronger emotional responses to common situations than thermal non-tasters. Additional studies to be reported will determine whether the intensity of emotions associated with foods varies with thermal taste status. Taken overall, these results contribute a fuller understanding of the total consumer experience of foods, informing product branding and marketing.

[49] CONSUMER ACCEPTABILITY OF BEER MADE WITH DANDELION, NETTLE & SAGE

Lydia Hayward, Adrienne Wedel, and Matthew McSweeney
School of Nutrition and Dietetics, Acadia University

Bitterness, a sensory attribute that is strongly associated with beer, is not appreciated by all consumers. Replacing hops, the primary source of bitterness in beer, with novel ingredients, may help in developing a beer suited to a wider range of consumers. The objective of this project was to determine the sensory attributes associated with beer made with sage, dandelion and nettle, instead of hops. A blonde ale was brewed with Hallertau Mittlefrüh and Saaz hops (control), sage, dandelion and nettle. A consumer trial (n=72) was conducted to determine the overall acceptability of the four different beers. Additionally, the consumers were asked to rate their liking of the flavour, appearance, and mouthfeel of the beers as well as answer a check-all-that-apply question. The check-all-that-apply question consisted of attributes determined by consumers from a preceding focus group (n=12) and a literature review. These ingredients did affect the sensory properties of the beer. The outcomes obtained from the study provided significant information about the sensory properties of beer, as well as consumer preferences. Sweet, citrus and wheat flavours were associated with consumer liking, as was sufficient clarity and carbonation of the beer. Conversely, bitterness negatively affected the consumer liking scores, especially female consumers. Overall, these ingredients did add new flavours to the beer, however the sage and nettle were not well liked by consumers.

[50] KNOWLEDGE AND CONSUMPTION PATTERNS OF FUNCTIONAL FOODS

Sharareh Hekmat and Karen S. Schuster-Bellemore
Brescia University, College at Western University

Many studies have been published on the health benefits and consumer acceptance of functional foods. However, Canadian consumers may not be familiar with the term, and therefore may not take full advantage of their health benefits. The purpose of this study was to generate information about the knowledge level and consumption patterns of functional foods amongst university students enrolled in first year courses at Brescia University College. University students (n=270) completed a survey to evaluate their knowledge and consumption patterns of functional foods. The majority of respondents (69%) were not familiar with the term functional foods. Despite this, most respondents consumed functional foods either daily or weekly. Of those that were familiar with the term functional foods, only 0.7% were able to correctly identify the definition of functional foods. Most respondents (71%) reported that health claims do affect their purchasing decisions, and 76% reported that they would purchase functional foods if they contained health claims. The majority of the respondents familiar with the term indicated that they consumed functional foods, which may suggest that having knowledge of the term functional foods increased the purposeful purchasing and consumption of such foods items. This study highlights that with increased knowledge, participants were more likely to report that they would consume functional foods on a regular basis.

[51] EFFECT OF ADDITION OF POLYPHENOLS RECOVERED FROM SPENT HOPS ON THE ANTIOXIDANT ACTIVITY AND HAZE STABILITY IN PHILADELPHIA PALE ALE BEER

Nymisha S. Ravindranath[1], Jasreen K. Sekhona[1]*, Franklin Winslow[2]
[1]*Drexel University, Philadelphia PA, USA*
[2]*Yards Brewing Company, Philadelphia, PA, USA*

Haze formation resulting from protein-polyphenol interaction in beer limits consumer acceptability and storage life. Polyphenols from spent hops may replace commercial polyphenols such as tannic acid added to clarify and stabilize the beer haze. The goal of this study was recovery and fortification of an optimum dosage of polyphenols from the natural hop waste, and monitor their influence as a natural finning agent towards the stabilization of haze in the finished product of Philadelphia Pale Ale (PPA) beer. Spent hop polyphenols were extracted using hydroalcoholic extraction from Cascade hop variety obtained from Yards Brewing Company (YBC) in Philadelphia, PA. Polyphenol extract was added during fermentation or after fermentation, and the optimum dosage determined based on haze stability. Haze was measured using light scattering technique. The total polyphenol content (TPC) and antioxidant were evaluated using Folin Ciocelteu method and Ferric reducing antioxidant power (FRAP), respectively. The results from the preliminary study showed that maximum extraction of polyphenols was recovered using 80% ethanol. TPC of intermediate products of the brewing process of PPA i.e., wort, kettleful, end of boil, wort, prefiltration (end of fermentation) and post filtration showed a TPC value of 0.75 mg GAE/mL, 0.61 mg GAE/mL, 0.69 mg GAE/mL, 0.41 mg GAE/mL, 0.41 mg GAE/mL, respectively. Considering drawbacks of current fining agents indicated by various studies and residual bitterness of spent hops preventing them from use in animal feed, extracting polyphenols from plethora of natural hop waste in beer industry is a sustainable solution to make use of the waste.

[52] COMBATING NEURAL TUBE DEFECT THROUGH FORTIFIED SALT CONTAINING FOLIC ACID

Oluwasegun Modupe, Kiruba Krishnaswamy, and Levente L. Diosady
Food Engineering Research Group, Chemical Engineering and Applied Chemistry Department, University of Toronto, Toronto, ON

The idea of adding folic acid to Double Fortified Salt was conceived due to the high incidence of neural tube defects. However, to address the metabolic interdependence of folic acid and vitamin B12 we initiated a program for the development of process technology for the delivery of iron, iodine, folic acid and B12 simultaneously through salt. Solutions with varying combinations of folic acid (0.5-1%), iodine (2%) and vitamin B12 (0.01%) were prepared. Freshly prepared solutions of the most stable formulations were sprayed onto salt and encapsulated ferrous fumarate was added. The resulting fortified salts contained 50 ppm iodine, 1000 ppm iron, and 12.5-25 ppm folic acid. The salts were stored at 25oC, 35oC and 45oC at 60-70 % RH. The impact of pH, citrate and concentration of folic acid on the stability of each micronutrient in the spray solutions (2 months) and salts (6 months) were investigated. Folic acid concentration and citrate had no effect on the stability of iodine and folic acid in the solutions and resulting salt samples, with 70-90% of the folic acid and 80-100% of the added iodine being retained in the spray solutions and fortified salts after storage.

[53] CONSIDERATIONS FOR THE DEVELOPMENT OF REGIONAL APPASSIMENTO WINES IN ONTARIO

Jennifer Kelly, Lisa Dowling, Gary Pickering and Debbir Inglis
Centre for Biotechnology, Brock University, St. Catharines, ON

The Ontario grape and wine industry is affected by climate change, and adaptation strategies are of interest to researchers to mitigate effects. Appassimento winemaking, where grapes are dried before vinified, is emerging as a trend in Ontario, as grapes have the opportunity to fully ripen in a protected environment, regardless of vintage-to-vintage variation associated with extreme weather events. This process increases flavours and aromas that contribute to a unique wine profile. However, the drying process can also lead to the accumulation of undesirable compounds. A local yeast isolate that is a known lower producer of such compounds has been trialed in this study, and may have application of Appassimento wine based on these characteristics. Wines were made with grapes that were dried to three target starting sugar concentrations and a control with this yeast, as well as the accepted commercial standard for comparison and analyzed for a number of chemical and sensorial metabolites. The yeast of interest reduced undesirable compounds in the wine, and the volatile organic compounds (VOC) analysis demonstrated differences in the compound concentrations amongst the wines elaborated with different yeasts. Descriptive analysis results illustrate differences in perceived flavour and aroma, as well. A consumer study has revealed that the yeast of interest was not preferred over the commercial standard yeast. This project aims to assist the wine industry by examining yeast strain choice for the fermentation on final wine quality in overcoming climatic barriers that affect grape and wine quality, while developing a unique signature for Ontario.

[54] DEVELOPMENT OF PROBIOTIC RICE PUDDING FORTIFIED WITH PREBIOTICS

Sharareh Hekmat and Maja Williams
Brescia University College

Lactobacillus rhamnosus GR-1 is a probiotic that has been shown to reduce the risk of urogenital problems and urinary tract infections. Rice pudding is a popular gluten-free dairy product and could be a vehicle to deliver L. rhamnosus GR-1 to a broader population. The purpose of this study was to investigate the growth and viability of L. rhamnosus gr-1 in six rice pudding samples, each one fortified with one type of prebiotic (short chain inulin- 2% w/w, 4%w/w; long chain inulin- 2%w/w, 4%w/w; oat- 0.5%w/w, 1%w/w), along with control, over a 21-day storage period. The objective was to determine if prebiotic fortification would have a positive effect on the microbial viability of L. rhamnosus GR-1, and to evaluate the sensory properties of the samples. All of the samples had viable levels of L. rhamnosus GR-1. Bacterial counts were at least 1 x 108 cfu/mL over the 21-day storage period. The probiotic rice pudding sample fortified with 4% w/w short chain inulin had the highest hedonic score for flavour, sweetness, texture and overall acceptability. This study shows that the addition of prebiotics contributed to viable cell counts of bacteria in all rice pudding samples, for the entire storage period. This research is important to the Canadian food industry as there is a potential for the production of a novel functional food.

[55] EFFECT OF NON-ALLERGEN BINDERS ON QUALITIES OF BEEF BURGERS

Tianzhi Yang[1], Zeb Pietrasik[2] and Mirko Betti[1]
[1]Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB
[2]Food and Bio Processing Branch, Alberta Agriculture and Forestry, Leduc, AB

Food allergy is one of the high-incidence diseases among the population in the world. According to the Allergy, Genes and Environment Network, approximately 2.5 million Canadians self-report having at least one food allergy. However, allergens like wheat are widely used in meat products as binders. In this study, selected alternative plant ingredients including potato starch, pea starch, rice flour and textured pea protein were applied into beef burgers at 2% and 4% levels. Cooking, physicochemical and sensory properties of raw and cooked burgers were compared with ones with 5% wheat crumb as control. Incorporation of non-allergen binders into beef burgers did not affect color of fresh patties compared to wheat crumb control. Textured pea protein added at 4% improved color and oxidative stability of raw burgers over 4 days of simulated retail display (4°C). Non-allergen binders added at 4% yielded burgers with similar cooking characteristics to wheat crumb and led to significantly lower cooking loss and higher moisture retention than those at 2% level ($p<0.05$). Except for potato starch, burgers formulated with 2% pea starch, rice flour, and textured pea protein were significantly harder and chewier than wheat crumb controls. The consumer sensory evaluation indicated that burgers with 4% pea starch and textured pea protein were comprehensively more acceptable in terms of overall liking, appearance, flavor, texture and aftertaste. The results of this study showed that pea starch and textured pea protein could be potentially utilized as gluten-free alternatives to a standardly used wheat crumb for meat binder applications.

[56] UTILIZATION OF STALED BREAD POWDER AS SUSTAINABLE FOOD ADDITIVE

Sabine El Hage and Valerie Orsat
Department of Bioresource Engineering, McGill University, Ste Anne de Bellevue, QC

Nowadays, an average net loss of approximately 37.4 thousand of dollars is annually lost from every Canadian bread manufactury. These losses are due to the bread staling phenomenon. This is a detrimental factor playing a significant role in economic losses worldwide to the bread industry. The primary focus will be to study the thermophysical properties of staled bread powder and test staled bread powder (SBP) in order to be reused in different food applications. In this regard, the mixing behavior of SBP and water (1:4 ratio) was analyzed at a wide temperature range (0 °C to 120 °C). The results did not show any gelatinization point which demonstrated high re-hydration capability of the SBP because of previous stages of gelatinization and high mechanical defection of starch granules during the baking process. The data were also in agreement with the low enthalpy of melting of crystals at 102.46 °C which was approximately 0.52 J/g. The rheological properties of the mixtures were also measured, and the data demonstrated a shear thinning behavior which resembled the commonly used hydrocolloid gums in the food and drug industries. Also, a Herschel-Buckley model was fitted to the data and a yield stress of 15.52 Pa, and a rate index of 0.31 was observed. Overall, the data showed a promising application of SBP as thickener agent for sustainable food production.

[57] EFFECT OF SOLVENT, PRE-HEATING TEMPERATURE AND TIME ON THE ULTRASONIC EXTRACTION OF PHENOLIC COMPOUNDS FROM COLD-PRESSED HEMPSEED

Jingbang Liang[a], Erika Zago[a], Ruchira Nandaisri[a], Rabie Khattab[b,c], N. A. Michael Eskin[a], Peter Eck[a], and Usha Thiyam-Holländera, [d*]

[a] *Department of Foods and Human Nutritional Sciences, University of Manitoba, W383 Duff Robin Building, Winnipeg, Manitoba R3T 2N2, Canada*

[b] *Food Science Department, Faculty of Agriculture (Saba Basha), Alexandria University, Alexandria, Egypt*

[c] *Department of Clinical Nutrition, College of Applied Medical Sciences, Imam Abdulrahman Bin Faisal University, Dammam, KSA*

[d] *Richardson Centre for Functional Foods and Nutraceuticals, University of Manitoba, 196 Innovation Drive, Winnipeg, Manitoba R3T 6C5, Canada*

The effect of different solvents [aqueous methanol (70%, v/v), aqueous acetone (80%, v/v) and a solvent-mixture (MA) of aqueous methanol (70%, v/v) and aqueous acetone (70%, v/v) in a ratio of 1:1 (v/v)], pre-heating temperatures (140, 160, 180 ℃) and times of exposure (5, 15, 30 minutes) on the ultrasonic extraction of the main phenolic compounds in hempseed (*Cannabis sativa*) extracts was investigated. A new HPLC method was developed to identify and quantify the main phenolics (namely N-*trans*-caffeoyltyramine and cannabisin-B) in the extracts. Two other major compounds numbered 3 and 4 were also detected. The results showed that the nature of the extracting solvent had a significant ($p<0.05$) impact on the ultrasonic extraction of phenolic compounds. The acetone extracts exhibited the highest total phenolic content (TPC), followed by MA and methanol. In addition, the pre-heating temperature and time of exposure both enhanced the TPC for all solvents examined. The main phenolics, N-*trans*-caffeoyltyramine, cannabisin-B and compound 3 were positively affected by the temperature and time of exposure irrespective of the solvents used. In sharp contrast, compound 4 appeared thermally sensitive as the amount of this compound decreased with increasing pre-heating time and temperature. This study demonstrated that acetone was the most effective extracting solvent and that pre-heating enhanced the yield of the main phenolics.