



Makanan



HPLC Determination of Furfural in Crude Palm Oil

Abdul Azis Ariffin
Abdulkarim Sabo Mohammed, Boo Huey Chern, Loi Chia Chun

Faculty of Food Science and Technology,
Universiti Putra Malaysia,
43400 UPM Serdang, Selangor, Malaysia
Tel: +603-8946 8354
abdulazis@putra.upm.edu.my



ABSTRACT

A modified steam distillation method was developed to extract furfural from crude palm oil (CPO). The collected distillates were analyzed using high performance liquid chromatography (HPLC) coupled with an ultraviolet diode detector at 284 nm. The HPLC method allowed identification and quantification of furfural in CPO. The unique thermal extraction of CPO whereby the fresh fruit bunches (FFB) are first subjected to steam treatment at 140-145°C, distinguishes itself from other solvent-extracted or cold-pressed vegetable oils. The presence of furfural was also determined in the fresh palm oil from FFB (without undergoing the normal extraction process), refined palm fractions (palm olein and palm stearin), and the secondary oil products from the mill (condensate oil and sludge oil). Furfural was only detected in CPO, condensate oil and sludge oil. HPLC analysis showed that CPO contains the highest amount of furfural, 20.60 mg/kg, and follows by condensate oil, 7.14 mg/kg, and sludge oil, 5.42 mg/kg.

Keywords: crude palm oil, hemicelluloses, xylose, furfural, and HPLC



Guava Pulp Composition: Moving from Industrial Waste to Useful Functional Food Ingredients

Amin Ismail¹
Kong Kin Weng¹, Emmy Hainida Khairul Ikram¹, Chin Ping Tan²,
Nor Fadilah Rajab³

¹Faculty of Medicine and Health Sciences,

²Faculty of Food Science and Technology,
Universiti Putra Malaysia,
43400 UPM Serdang, Selangor, Malaysia

³Faculty of Allied Health Sciences,
Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz,
50300, Kuala Lumpur, Malaysia
Tel: + 603-8947 2435
amin@medic.upm.edu.my



ABSTRACT

Functional ingredients are one of the key areas for growth and development in food processing industry. Food industry generates huge amount of wastes or by-products that contain highly valuable bioactive compounds. Malaysia is one of the largest pink guava (*Psidium guajava*) puree exporter which supplying about 20% of the world guava puree. In the production of guava puree, by-products can be obtained during crushing, refining and sieving stages namely refiner, sieve and decanter, respectively. Daily production of the industry produces huge amount of the by-products which can achieve up to 25 metric tonnes. Exploitation of the potential of these by-products as functional sources could reduce the cost and problem for managing the by-products disposal. Decanted by-product which does not contain seeds and peels was found as the most potential by-product for hydrophobic bioactive compounds. It exhibited the highest in lycopene content and antioxidants among the by-products. Further work was done in producing guava's lycopene-rich powder which involved thermal treatment to produce a product with high lycopene content and antioxidants. Steam blanching at 60°C for 20 min was found to be able to increase the lycopene content by 13%. Optimisation of the oven drying conditions based on response surface methodology indicated that the maximum lycopene could be obtained at 43.8 °C for 6.4 h. Supercritical fluid extraction (SFE) was also used to produce a high quality product. More than 4 fold of extract yield was successful obtained using SFE as compared to solvent extraction. For commercialisation purposes, SFE was demonstrated as a good technique to produce guava by-product with high level of hydrophobic fractions which directly contributed to their active components. The invention discloses the use of the pulp composition as starting material for obtaining guava lycopene, as antioxidant.

Keywords: *psidium guajava*, industrial waste, lycopene, antioxidants, functional ingredients

Essential Fatty Acids of Pitaya (Dragon Fruit) Seed Oil

Abdul Azis Ariffin

Faculty of Food Science and Technology,
Universiti Putra Malaysia,
43400 UPM Serdang, Selangor, Malaysia
Tel: +603-8946 8354
abdulazis@putra.upm.edu.my



ABSTRACT

Hylocereus undatus and *Hylocereus polyrhizus* are two varieties of the commonly called pitaya fruits. The seeds were separated and the seed oil was extracted and analysed. Essential fatty acids, namely, linoleic and linolenic form a significant percentage of the unsaturated fatty acids of the seed oil extract. Both pitaya varieties exhibit 2 oleic acid isomers. Essential fatty acids are important acids that are necessary substrates in animal metabolism and cannot be in situ-synthesised. Both pitaya varieties contain about 50% essential (C18:2 (48%) and C18:3 (1.5%)) fatty acids. This poster details the process of recovering the pitaya seeds and determining the fatty acid of the extracted oil.

Keywords: pitaya, seed oil, essential fatty acids, linoleic, linolenic



Optimisation of Binary Solvent Extraction System for Polyphenols and Antioxidant Capacity from *Mengkudu* Aerial Parts using Response Surface Methodology

Tan Chin Ping
Ho Chun Wai, Thoo Yin Yin, Ho Swee Kheng

Faculty of Food Science and Technology,
Universiti Putra Malaysia,
43400 UPM Serdang, Selangor, Malaysia
Tel: +603-8946 8418
tancp@putra.upm.edu.my



ABSTRACT

Objective of this study was to optimise extraction conditions for crude polyphenols from *Mengkudu* (*Morinda citrifolia*) aerial parts by using response surface methodology (RSM). A rotatable central composite design (CCD) was applied to the model to investigate the effects of three independent variables, namely ethanol concentration (%), extraction time (min) and temperature ($^{\circ}$ C) on four responses, total phenolic content (TPC), total flavonoids content (TFC), 2,2'-Azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) diammonium salt (ABTS) radical scavenging capacity, and 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging capacity. These independent variables were coded at three levels and their ranges selected on the basis of preliminary experimental results. The rotatable central composite design consisted of 14 experimental points and six replications at the center point. The experimental results fitted well to the model, TPC (mg GAE/ 100 g DW) ($R^2= 0.7279$), TFC (mg CE/ 100 g DW) ($R^2= 0.9557$), ABTS (μ mol TEAC/ 100 g DW) ($R^2= 0.9554$), and DPPH (μ mol TEAC/ 100 g DW) ($R^2= 0.9489$) through multiple linear regressions with backward elimination. TPC, TFC, ABTS, and DPPH showed different patterns of extractability with significant variation in the linear, quadratic, and interaction effects of the independent variables. Desirability was higher to optimise single response or two responses originated from either polyphenols content or antioxidant capacity but not all four responses. The optimised conditions for recovery of high quality polyphenols were 73.78% ethanol, 66.16 min and 33.11 $^{\circ}$ C while, maximum yield of polyphenols recovery were 51.25% ethanol, 40.27 min and 56.89 $^{\circ}$ C. All the four responses (TPC, TFC, ABTS and DPPH) showed significant differences ($p<0.05$) with predicted values, thus indicating suitability of the model employed using RSM in optimising the extraction conditions for polyphenols from *M. citrifolia*.

Keywords: optimisation of extraction, *mengkudu* (*memorinda citrifolia*), response surface methodology (RSM), phenolics, flavonoids, polyphenols, 2,2'-Azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) diammonium salt (ABTS), 2,2'-diphenyl-1-picrylhydrazyl (DPPH), antioxidant capacity

Breast Cancer Treatment Potential by Tropical Red Seaweeds (*Eucheuma cottonii*)

Suhaila Mohamed
Fatemeh Shamsabadi, Rasedee Abdullah

Faculty of Food Science and Technology/
Institute of Bioscience,
Universiti Putra Malaysia,
43400 UPM Serdang, Selangor, Malaysia
Tel: +603-8946 8391
Mohamed.suhaila@gmail.com



ABSTRACT

Breast cancer affects 10-25% of women globally. Effective new method to prevent and treat this malignancy is urgently needed, especially from local tropical sources. The present study was conducted to evaluate the therapeutic effects of Malaysian red seaweed, *Eucheuma cottonii* ethanol extract (ECE) on mammary gland tumor. Solid mammary tumors were induced within 6-8 weeks in female Sprague-Dawley rats by injecting CRL 2283 mammary cancer cell line into the breast. Tumor development was monitored by weekly palpation. Oral administration of ECE at a dose of 100 mg/kg body weight for four weeks significantly ($P < 0.05$) regressed and inhibited the growth of tumors compared to untreated control rats and better than 10mg/kg tamoxifen. The levels of antioxidant enzyme and lipid peroxidation were measured in the rats erythrocyte and plasma, respectively, before and after treatment, and showed significant decrease ($P < 0.05$) in lipid peroxidation with the ECE treatment. The ECE exhibited effective anti mammary carcinoma properties in this in-vivo model and may provide a potential alternative or complementary therapy for breast cancer treatments.

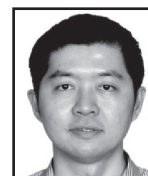
Keywords: breast cancer, CRL 2283 cell line, *Eucheuma cottonii* L., lipid peroxidation, antioxidant status, sprague-dawley rats



Production and Characterisation of Phytosterol Nanodispersion for Food Application

Tan Chin Ping
Leong Wai Fun, Yaakob Che Man, Lai Oi Ming, Kamariah Long, Misni Misran

Faculty of Food Science and Technology,
Universiti Putra Malaysia,
43400 UPM, Serdang, Selangor, Malaysia
Tel: +603-8946 8418
tanpc@putra.upm.edu.my



ABSTRACT

Phytosterols are well known for their cholesterol lowering effect. Due to their water insoluble nature, phytosterols fortification was limited to high fats food products. The purpose of this study was to optimize the production parameters involve in the production of water soluble phytosterol nanodispersion for use in food industry. In this study, response surface methodology (RSM) was employed to model and optimize three of the processing parameters namely mixing time by conventional homogenizer (t , 1 - 20 min), mixing speed by conventional homogenizer (v , 1000 - 9000 rpm) and homogenisation pressure by high pressure homogenisation (P , 0 - 80 MPa). All responses namely particles size (PS), polydispersity index (PDI) and phytosterol concentration in nanodispersion produced (Phyto, mg/L) were well-fitted into a reduced quadratic model by multiple regression after manual elimination. The coefficient of determination (R^2) and absolute average deviation (AAD) values for PS, PDI and Phyto are 0.9902, 0.9065, 0.8878; and 0.8785%, 0.2136%, 0.2177% respectively. The optimized processing parameters were 15.25 min of mixing time, 7000 rpm of mixing speed and 42.4 MPa of homogenisation pressure. The corresponding responses for the optimized preparation condition are particle size of 52 nm, polydispersity index of 0.339 and 336 mg/L of phytosterol concentration in nanodispersion produced. The chi-square test had verify the model whereby the experiment value of PS, PDI and Phyto agreed to that predicted values at 0.05 level of significant. The produced stable water soluble phytosterols nanodispersion is predicted to have better hypocholesterlemic effect due to their small particle size, and it is applicable to a wider range of food product included low fat and low calories food products.

Keywords: phytosterol, nanodispersion, response surface methodology, RSM, high pressure homogenisation, particle size

