

ANTIOXIDANT ACTIVITY AND NUTRITIONAL
COMPOSITION OF SELECTED VEGETABLES
THAT UNDERGOED DIFFERENT PRESERVATION
METHODS

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Antioxidative activity and nutritional composition of selected vegetables that undergone different preservation methods / Lim C'hee Chien.

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ANTIOXIDATIVE ACTIVITY AND NUTRITIONAL
COMPOSITION OF SELECTED VEGETABLES THAT
UNDERGONE DIFFERENT PRESERVATION METHODS

LIM CHEE CHIEN

RESEARCH PROJECT submitted in partial fulfillment of the requirements for the
Degree of Bachelor of Food Science
(Food Service and Nutrition)

FAKULTI AGROTEKNOLOGI DAN SAINS MAKANAN
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
MENGABANG TELIPOT
2006

This project should be cited as:

Lim, C. C., 2006. Antioxidative activity and nutritional composition of selected vegetables that undergone different preservation methods. Undergraduate thesis, Bachelor of Food Science (Food Service and Nutrition). Faculty of Agrotechnology and Food Science, Kolej Universiti Sains dan Teknologi Malaysia, Terengganu. 77p.

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DECLARATION

I hereby declare that this research project is based on my original work except for quotations and summaries which have been duly acknowledged.

4th May 2006

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4th May 2006

Approved by,

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ACKNOWLEDGEMENT

Among the most difficult words to write are those that express the depth of our gratitude to many dedicated people whose efforts have made this final year project possible. First of all, I would like to extend my warmest appreciation to my developed supervisor, Mr. Mohamad Khairi Mohamad Zainol for his remarkable guidance, encouragement, patient and professional knowledge that help me all the way to accomplish this thesis.

A special thanks to all the lecturers from Department of Food Science. Thanks for their guidance and recommendation that helped me a lot in completing this final year project. Besides that, it is unforgettable to forward my acknowledgment to all the lab assistants of Department of Food Science especially Cik Suzana, Cik Aniza, Pn. Fadlina, Cik Nasrenim, En. Aswady, Pn. Dayang, Cik Rose, and Pn. Faridah, and also staffs from Department of Fisheries, including Pn. Faridah and En. Syahrul. Thanks for their kindness and always gave me their fully support and cooperation.

I want to express my gratitude to all my coursemates and friends to lend me a hand throughout my process in finishing this project. I also feel it is important to acknowledge and thank my family for all their love, concern and support.

Last but not least, I would like to extend my appreciation to the librarians from the KUSTEM library and Perlis State Library who had provided me a lot of convenience in getting the useful information to complete my project. Thank you very much.

ABSTRACT

Five types of common vegetables in Malaysia were selected, namely carrot, sweetcorn, garlic, shallot, and chilly. The objectives of this study were to determine antioxidative activity and nutritional composition of these samples before and after undergoing different preservation methods, including freezing and pickling. Proximate analysis had been done to determine the nutritional value while ferric thiocyanate method was used to determine the antioxidative activities among the samples, extracted by methanol and ethyl acetate. After drying, water activity for all samples was in the range of 0.3 to 0.6 which do not have problem with microbial growth. There were no significant ($p < 0.05$) difference in moisture content of all frozen samples as compared to fresh samples. However, moisture content of samples that were pickled by vinegar was significantly higher than fresh samples. The loss of ash content in frozen samples was significantly ($p < 0.05$) lower than the pickled samples. All the pickled samples had lost about 40% of ash content while frozen samples were 20%. After frozen and pickled, the loss of crude protein in all samples showed significance values. Freezing caused the loss at a range of 8% to 10% among the samples. For fat content, the loss of frozen samples was lower than the pickled samples. All the samples which were pickled by sugar syrup had lost the highest percentage of fat content. As comparing the crude fiber to the fresh samples, all samples that were frozen and pickled were significantly ($p < 0.05$) lower. In carrot, garlic, and shallot, there were no significant ($p < 0.05$) difference in fiber content between methods of freezing and pickling. In overall, freezing was found to be better than pickling in order to maintain the nutritional compound during preservation. In determination of antioxidative activity, the entire methanol extracts of fresh samples showed strong antioxidative activities as compared to BHT and α -tocopherol, except carrot, which its antioxidative activity was significantly ($p < 0.05$) lower than BHT, but same with α -tocopherol. All the samples which were pickled by vinegar, salt and sugar were significantly ($p < 0.05$) lower in antioxidative activities as compared to the fresh and frozen samples, except sweetcorn. There were no significant ($p < 0.05$) difference of antioxidative activity between the processed sweetcorn and fresh sweetcorn. However, all the entire ethyl acetate extracts had shown significantly ($p < 0.05$) lower antioxidative activities than that of BHT. The differences of antioxidative activities occur between the different solvent extractions. Solvent with high polarity were widely used and effective for extraction of antioxidants. In conclusion, freezing was better than pickling in preservation of food products due to the bad effects on nutritional composition and antioxidative activities were less than the pickling methods.

AKTIVITI ANTIOKSIDA DAN KANDUNGAN NUTRIEN BAGI BEBERAPA JENIS SAYURAN TERPILIH YANG TELAH MELALUI PROSES PENGAWETAN YANG BERLAINAN

ABSTRAK

Lima jenis sayuran yang biasa dalam pasaran Malaysia dipilih sebagai sampel kajian, iaitu lobak merah, jagung, bawang putih, bawang merah, dan cili. Objektif kajian adalah untuk menentukan aktiviti antioksidasi dan kandungan nutrient dalam sampel segar dan sampel yang telah melalui proses penyejukbekuan dan penjerukan. Analisis proksimat dijalankan untuk penentuan kandungan nutrien dalam sampel manakala aktiviti antioksidasi ditentukan dengan kaedah Ferric Thiocyanate (FTC) di mana dua jenis pelarut iaitu methanol dan etil asetat digunakan untuk mengekstrak sampel. Selepas pengeringan, a_w bagi semua sampel adalah pada lingkungan 0.3 hingga 0.6. bagi kandungan kelembapan, keputusan menunjukkan tiada perbezaan signifikan antara sampel sejukbeku dengan sampel segar. Namun, sampel yang dijeruk dengan cuka telah menunjukkan perbezaan signifikan dengan sampel lain, malahan lebih tinggi daripada sampel segar. Kandungan abu bagi semua sampel terproses menunjukkan perbezaan signifikan dengan sampel asal. Kehilangan kandungan abu dalam sampel sejukbeku adalah kira-kira 20% manakala sampel jeruk mengalami kehilangan lebih daripada 40%. Proses penyejukbekuan juga menyebabkan kehilangan protein dalam lingkungan 8-10% manakala proses penjerukan telah menyebabkan kehilangan protein yang kritikal pada semua jenis sayuran. Kehilangan kandungan lemak bagi sampel sejukbeku juga lebih rendah daripada sampel yang dijeruk. Antara sampel jeruk, didapati kehilangan kandungan lemak adalah paling tinggi dalam sampel yang dijeruk dengan air gula. Apabila membandingkan dengan kandungan serat dalam sampel segar, didapati kandungan serat bagi semua sampel sejukbeku dan sampel jeruk adalah lebih rendah. Namun, didapati tiada perbezaan signifikan antara proses sejukbeku dan penjerukan pada sampel lobak merah, bawang putih dan bawang merah. Dalam penentuan aktiviti antioksidasi, didapati semua ekstrak sampel segar dengan methanol menunjukkan aktiviti antioksidasi yang kuat apabila berbanding dengan BHT dan α -tocopherol, kecuali lobak merah. Namun begitu, aktiviti antioksidasi bagi lobak merah adalah setaraf dengan α -tocopherol. Aktiviti antioksidasi bagi semua sampel jeruk didapati adalah lebih rendah daripada sampel segar dan sampel sejukbeku melainkan jagung. Keputusan menunjukkan jagung sejukbeku dan jagung jeruk tiada perbezaan signifikan dengan sampel segar. Bagi ekstrak etil asetat, aktiviti antioksidasi dalam semua sampel adalah lebih rendah daripada BHT. Ekstrak daripada sampel segar adalah tiada perbezaan signifikan dengan α -tocopherol. Keputusan menunjukkan ada perbezaan signifikan dalam aktiviti antioksidasi bagi sampel yang diekstrak dengan kedua-dua jenis pelarut. Biasanya, pelarut berpolar tinggi dipakai dengan meluas dan lebih berkesan untuk pengekstrakan unsur antioksidasi. Kesimpulannya, proses penyejukbekuan adalah lebih baik daripada kaedah penjerukan dalam pengawetan produk makanan kerana kesannya ke atas kandungan nutrien dan aktiviti antioksidasi adalah lebih rendah.