



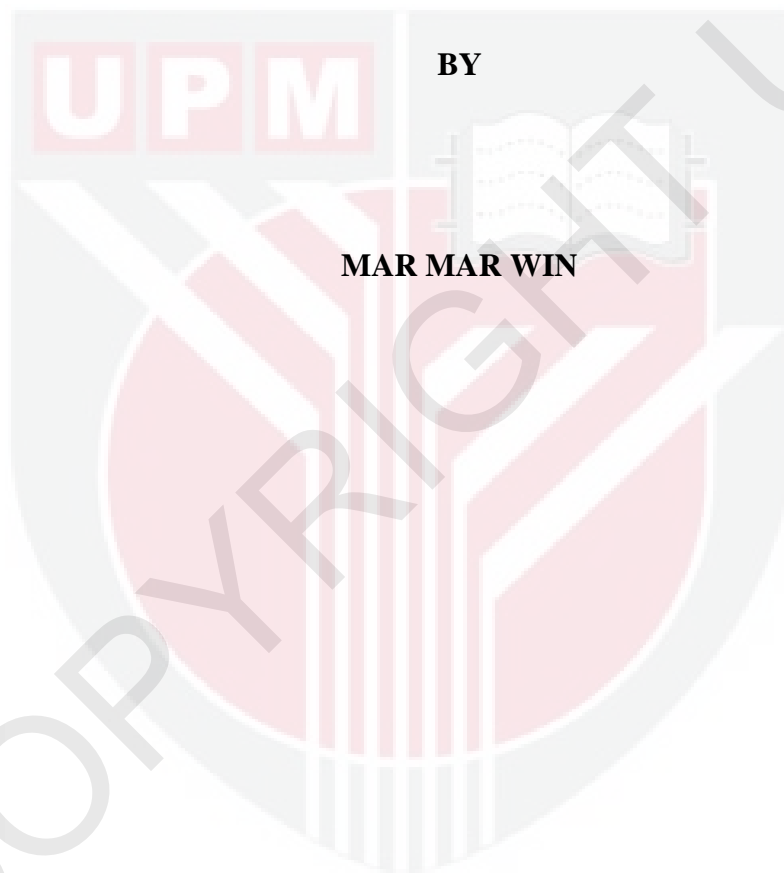
UNIVERSITI PUTRA MALAYSIA

**CHANGES IN PHENOLIC COMPOUND PROFILES AND ANTIOXIDANT
ACTIVITY OF PEANUT (*ARACHIS HYPOGAEA L.*) AS AFFECTED BY
ROASTING AND STORAGE CONDITIONS**

MAR MAR WIN

FSTM 2011 20

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ROASTING AND STORAGE CONDITIONS**



**This thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in fulfilment of the requirements for the Degree of Master of Science**

July 2011

DEDICATION

I dedicate this thesis to my parents and my country.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

CHANGES IN PHENOLIC COMPOUND PROFILES AND ANTIOXIDANT ACTIVITY OF PEANUT (*Arachis hypogaea* L.) AS AFFECTED BY ROASTING AND STORAGE CONDITIONS

By

MAR MAR WIN

July 2011

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Faculty : Food Science and Technology

Peanut (*Arachis hypogaea* L.) has been recognised as a functional food because of the presence of numerous phytochemicals with antioxidant capacity. In this study, peanut skin, hull, raw peanut and roasted peanut flour were analysed for their contents of total phenols, antioxidant activity and individual phenolic composition. The effect of different roasting times (0, 10, 20, 30, 40, 50 min at 160 °C) of peanut flour (with and without skin) on phenolic compounds and their antioxidant activity were evaluated. Changes of phenolic composition and antioxidant activity were also monitored during storage of roasted peanut flour at 5, 25, and 37°C for 0, 15, 30, 45 and 60 days.

Results of the study showed that peanut skin had a significantly ($p < 0.05$) higher total phenolic compounds (TPC) and exhibited higher antioxidant activity than that of hulls, roasted peanut flour, and raw peanut as measured by DPPH, Linoleic acid peroxidation and TBA method, confirming the fact that phenolic compounds in peanuts are largely concentrated in the skins. Interestingly, as increasing roasting times, TPC and antioxidant capacity of peanut flour with and without skin, were significantly ($p < 0.05$) increased in a time dependent manner. Results of HPLC analysis revealed that the concentration of *p*-coumaric acid and quercetin in peanut flour with skin significantly ($P < 0.05$) increased after 30, 40, and 50 min of roasting. However, most of the phenolic compounds in peanut flour without skin, decreased gradually after 20 min of roasting time. Changes in TPC of roasted peanut flour without skin were independent of storage time and temperature, but antioxidant activity was found to be quite stable when stored at 5 °C. Individual phenolic compounds of roasted peanut flour without skin were significantly increased at the end of storage. After 45 days of storage, the levels of TPC of roasted peanut flour with skin significantly increased at all storage temperatures. However, antioxidant activity did not change significantly during storage. Surprisingly, individual phenolic compositions of roasted peanut flour with skin were found to be unstable and degraded at the end of storage (60 days). In conclusion, this study revealed that roasted peanut flour can be used as functional food ingredient with excellent sources of natural antioxidant compounds when appropriate processing and storage conditions are applied.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah master sains

**PENGARUH PEMANGGANGAN DAN PENYIMPANAN TERHADAP
PROFIL SEBATIAN FENOL DAN AKTIVITI ANTIOKSIDAN KACANG
TANAH (*Arachis hypogaea* L.)**

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Kacang tanah (*Arachis hypogaea* L.) telah diakui sebagai makanan berfungsi kerana terdapat pelbagai sebatian fitokimia dengan kapasiti antioksidan. Dalam kajian ini, kulit dalaman, kulit luaran, kacang mentah dan tepung kacang tanah terpanggang dianalisis untuk total fenol, aktiviti antioksidan dan komposisi fenolik individu. Kesan masa pemanggangan yang berbeza (0, 10, 20, 30, 40 dan 50 minit pada 160 °C) ke atas sebatian fenolik dan aktiviti antioksidan untuk tepung kacang tanah terpanggang (dengan dan tanpa kulit dalaman) dinilai. Perubahan komposisi fenolik dan aktiviti antioksidan semasa penyimpanan tepung kacang tanah terpanggang juga dipantau pada 5, 25, dan 37 °C pada hari 0, 15, 30, 45 dan 60.

Keputusan kajian menunjukkan bahawa kulit dalaman kacang tanah mengandungi jumlah fenolik (TPC) ($p < 0.05$) dan aktiviti antioksidan lebih tinggi dari kulit luaran kacang, tepung kacang terpanggang, dan kacang mentah apabila dinilai dengan kaedah DPPH, asid linoleik dan TBA. Ini membuktikan bahawa sebatian fenolik yang tinggi terdapat dalam kulit dalaman kacang tanah. Menariknya, peningkatan masa pemanggangan meningkatkan secara signifikan ($p < 0.05$) nilai TPC dan kapasiti antioksidan tepung kacang terpanggang dengan dan tanpa kulit. Keputusan analisis HPLC menunjukkan bahawa peningkatan nilai asid p-kumarik dan kuersetin dalam tepung kacang terpanggang dengan kulit adalah signifikan ($p < 0.05$) selepas 30, 40, dan 50 minit dipanggang. Namun, sebahagian besar sebatian fenolik dalam tepung kacang panggang tanpa kulit, menurun secara berperingkat selepas 20 minit masa pemanggangan. Perubahan TPC dalam tepung kacang terpanggang tanpa kulit adalah tidak dipengaruhi masa simpanan dan suhu, tetapi aktiviti antioksidan adalah stabil dalam simpanan pada 5°C . Sebatian fenolik tepung kacang terpanggang tanpa kulit secara signifikan meningkat pada akhir simpanan. Setelah 45 hari simpanan, tahap kandungan TPC tepung kacang terpanggang dengan kulit meningkat secara signifikan untuk semua suhu simpanan. Namun, aktiviti antioksidan tidak berubah secara signifikan selama penyimpanan. Menariknya, komposisi fenolik dari tepung kacang terpanggang dengan kulit didapati tidak stabil dan mengalami pengurangan pada akhir simpanan (60 hari). Sebagai kesimpulan, kajian ini menunjukkan bahawa tepung kacang terpanggang boleh diaplikasikan sebagai bahan makanan berfungsi dengan sumber sebatian antioksidan semulajadi yang terbaik apabila keadaan pemprosesan dan penyimpanan yang sesuai digunakan.

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I certify that a Thesis Examination Committee has met on 2 August 2011 to conduct the final examination of Mar Mar Win on her thesis entitled “ **Changes in phenolic compound profiles and antioxidant activity of peanut (*Arachis hypogaea* L.) parts as affected by roasting and storage conditions**” in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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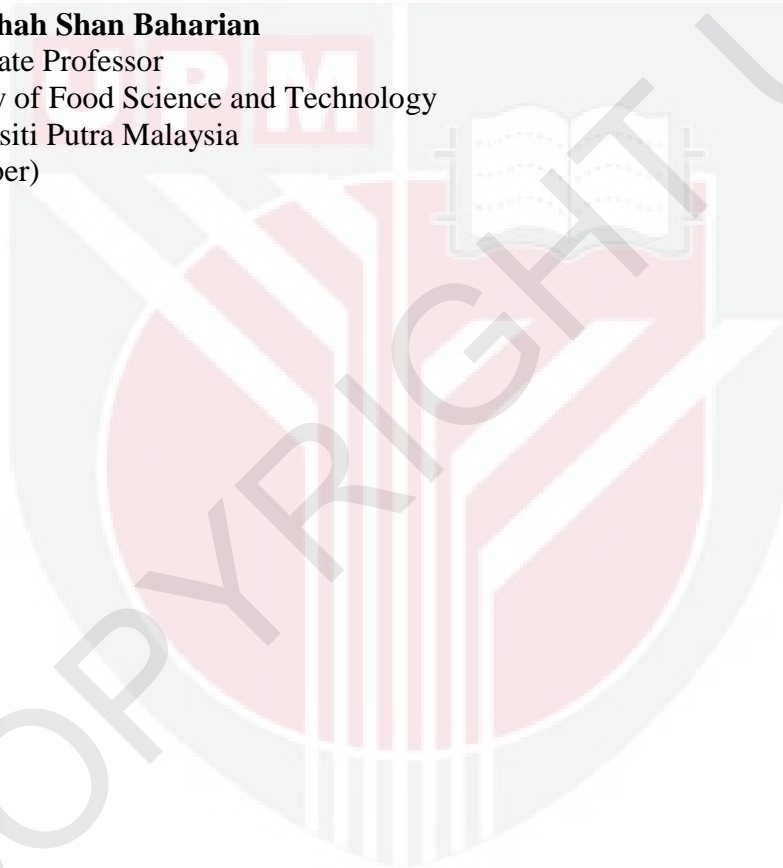
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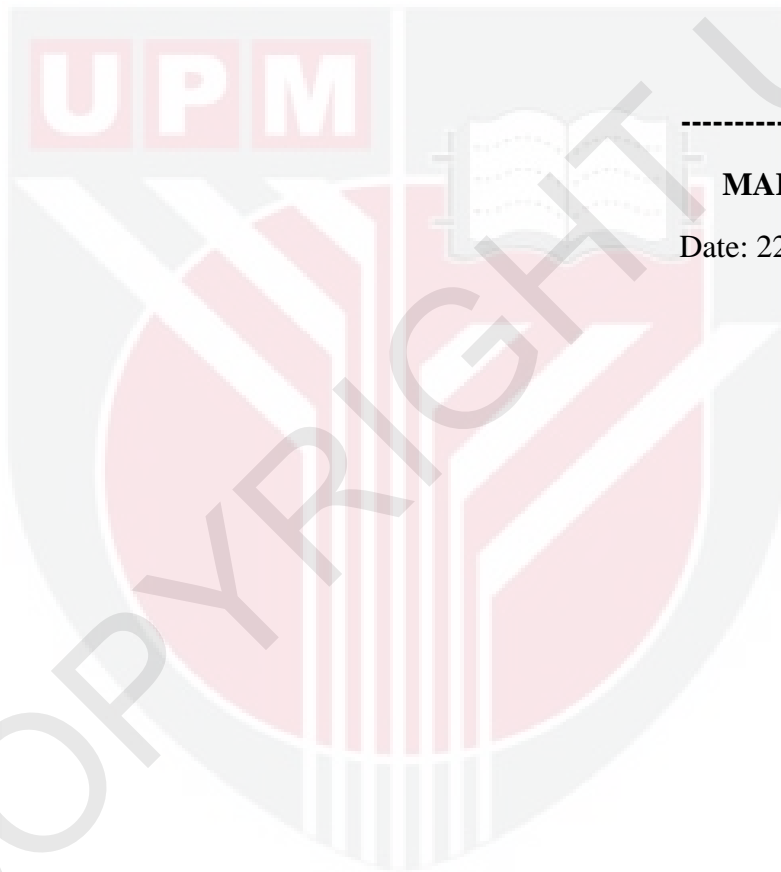
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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.



MAR MAR WIN

Date: 22 July 2011

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