

ANALYSIS OF GREEN, OOLONG AND BLACK TEA
BY THE *Ascorbic acid* method.

THE UNIVERSITY OF TORONTO

SCHOOL OF AGRICULTURE AND FOOD SCIENCE
UNIVERSITY OF TORONTO
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DEVELOPMENT OF GREEN, OOLONG AND BLACK TEA FROM
Artemisia capillaris.

By

LAILA RUWAIDA BINTI MOHD ZAINUDDIN

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

FACULTY OF AGROTECHNOLOGY AND FOOD SCIENCE
UNIVERSITY MALAYSIA TERENGGANU
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DECLARATION

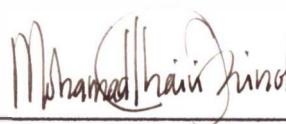
I hereby declare that the thesis is based on my original work except for the quotations and citations which have been duly acknowledgement. I also declare that it has not been previously or concurrently submitted for any degree at UMT or other institutions.



LAILA RUWAIDA BINTI MOHD ZAINUDDIN

Date: 25/6/07

Approved by



(MOHAMAD KHAIRI MOHD ZAINOL)

Date:

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ABSTRACT

Artemisia capillaris or Yin Chen Hao has been used in Chinese herbal medicine for over 2,000 years. It is an effective remedy for liver problems, being specifically helpful in and strengthening effect upon the liver, gallbladder and digestive system. The objectives of this study were to develop green tea, oolong tea and black tea from *A. capillaris*, to compare the *A. capillaris* in terms of sensory attributes and physical characteristics, and to determine minerals content and phenolic compound in the teas. The colour of *A. capillaris* green tea was green; while *A. capillaris* oolong tea and black tea was dark green. The teas have been compared with true black tea in sensory evaluation to evaluate sensory attributes such as colour, aroma, bitterness, taste and overall acceptance. The results showed that *A. capillaris* black tea colour and aroma was the most accepted. On the other hand, *A. capillaris* green tea was the most accepted tea as it showed the highest mean score for taste, bitterness and overall acceptance attributes. All the samples showed no significance difference ($p < 0.05$). Determination of mineral content using AAS in green tea, oolong tea and black tea showed that the highest mineral content that found in the teas was magnesium, ferum, followed by calcium and copper respectively. *A. capillaris* black tea showed the highest magnesium ($16.38 \pm 2.37\text{mg}/100\text{g}$), ferum ($5.61 \pm 2.29\text{mg}/100\text{g}$), calcium ($2.55 \pm 0.42\text{mg}/100\text{g}$) and copper ($0.47 \pm 0.20\text{mg}/100\text{g}$). *A. capillaris* green tea showed the lowest magnesium ($11.86 \pm 0.82\text{mg}/100\text{g}$), ferum ($3.08 \pm 0.62\text{mg}/100\text{g}$) and calcium ($2.27 \pm 0.18\text{mg}/100\text{g}$) content except for the copper as the *A. capillaris* oolong tea showed the lowest content ($0.44 \pm 0.10\text{mg}/100\text{g}$). Results from mineral content also showed that no significant ($p < 0.05$) difference was exhibited in determination of mineral content between the *A. capillaris* teas. Methanol was used as the extraction solvent and total phenolic compound was determined using Folin-Ciaocalteu phenol reagent method. *A. capillaris* green tea was depicted as highest in total phenolic compound but it showed no significant difference ($p < 0.05$) compared to other tea.

PENGHASILAN TEH HIJAU, TEH OOLONG, DAN TEH HITAM DARI *Artemisia capillaris*

ABSTRAK

Artemisia capillaris atau Yin Chen Hao telah digunakan dalam perubatan herba Cina sejak 2,000 tahun lalu. Ianya didapati berkesan dalam mengubati penyakit hati, di mana ianya berupaya menguatkan hati, pundi hempedu dan sistem pencernaan. Kajian ini dijalankan untuk menghasilkan teh hijau, teh oolong dan teh hitam dari *A. capillaris*, membandingkan ciri-ciri fizikal teh, penerimaan teh menggunakan ujian penilaian sensori, dan menentukan kandungan mineral dan sebatian fenolik. Warna bagi teh hijau *A. capillaris* adalah hijau manakala warna bagi teh oolong dan teh hitam *A. capillaris* adalah hijau gelap. Dalam penilaian sensori, teh *A. capillaris* telah dibandingkan dengan teh hitam sebenar bagi ciri-ciri warna, aroma, kepahitan, rasa dan penerimaan keseluruhan. Didapati warna dan aroma teh hitam *A. capillaris* paling diterima oleh panel, manakala teh hijau *A. capillaris* menunjukkan min skor yang tertinggi bagi atribut rasa, kepahitan, dan penerimaan keseluruhan. Kesemua sampel tidak menunjukkan perbezaan yang signifikan ($p < 0.05$) bagi kesemua atribut sensori. Penentuan kandungan mineral menggunakan AAS dalam kesemua jenis teh *A. capillaris* mendapati teh hitam *A. capillaris* mengandungi kandungan mineral magnesium, ferum, kalsium dan kuprum yang paling tinggi berbanding teh lain iaitu magnesium ($16.38 \pm 2.37 \text{mg}/100\text{g}$), ferum ($5.61 \pm 2.29 \text{mg}/100\text{g}$), kalsium ($2.55 \pm 0.42 \text{mg}/100\text{g}$) dan kuprum ($0.47 \pm 0.20 \text{mg}/100\text{g}$). Teh hijau *A. capillaris* menunjukkan kandungan mineral yang paling rendah iaitu magnesium ($11.86 \pm 0.82 \text{mg}/100\text{g}$), ferum ($3.08 \pm 0.62 \text{mg}/100\text{g}$) dan kalsium ($2.27 \pm 0.18 \text{mg}/100\text{g}$) kecuali bagi kuprum dimana teh oolong *A. capillaris* menunjukkan bacaan yang terendah iaitu ($0.44 \pm 0.10 \text{mg}/100\text{g}$). Tiada perbezaan yang signifikan pada ($p < 0.05$) dalam kandungan mineral dalam teh. Metanol telah digunakan sebagai bahan pengekstrakan dan kandungan bahan fenolik dalam teh ditentukan menggunakan kaedah reagen fenol Folin-Ciaocalteu. Teh hijau *A. capillaris* menunjukkan jumlah kandungan bahan fenolik yang tertinggi dan tiada perbezaan signifikan ($p < 0.05$) antara sampel.