

**COMPARISON ON COMPOSITION AND PHYSICAL
PROPERTIES OF DRIED LOCUST (LOCUSTA
MIGRATORIA MANILENSIS) POWDER FROM
DIFFERENT SOURCES**

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by

VINNIE ANG JIA WEN

A dissertation submitted in partial fulfillment of the requirements for the degree of
Bachelor of Technology (B.Tech) in the field of Food Technology
School of Industrial Technology
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July 2020

DECLARATION BY AUTHOR

This dissertation is composed of my original work and contains no material previously published or written by another person except where due reference has been made in the text. The content of my dissertation is the result of work I have carried out since the commencement of my research project and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution.

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LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation/ Symbol	Caption
a*	Red-green direction of the colour
AA	Amino acid
ACE	Angiotensin converting enzyme
ANOVA	Analysis of variance
b*	Yellow-blue direction of the colour
CFU	Colony forming unit
cm	Centimetre
CO ₂	Carbon dioxide
DPPH	2,2-diphenyl-1-picrylhydrazyl
EAA	Essential amino acid
EC ₅₀	Half maximal efficiency
eq.	Equivalent
FAO	Food and Agriculture Organization
GHGs	Greenhouse gases
GHz	Gigahertz
H	Hour
HCl	Hydrochloric acid
IC ₅₀	Half maximal inhibitory concentration
J	Joule
kg	Kilogram
kW	Kilowatt

L*	Lightness
M	Molarity
MHz	Megahertz
min	Minute
mL	Millilitre
mm	Millimetre
MUFA	Monounsaturated fatty acid
nd	Second
NaOH	Sodium hydroxide
ppm	Parts per million
PUFA	Polyunsaturated fatty acid
s	Second
st	First
S1	Sample 1
S2	Sample 2
WHO	World Health Organization
α	Alpha
B	Beta
μM	Micromolarity
%	Percent
m^2	Meter square
$^{\circ}\text{C}$	Degree Celsius
<	Less than
>	Greater than

±

Plus minus

PERBEZAAN DALAM KOMPOSISI DAN SIFAT FIZIKAL ANTARA SERBUK BELALANG JUTA (LOCUSTA MIGRATORIA MANILENSIS) DARI SUMBER BERBEZA.

ABSTRAK

Ternakan konvensional yang ada sekarang tidak lagi mencukupi untuk penggunaan manusia pada masa depan kerana permintaan makanan meningkat apabila populasi global meningkat. Entomofagi boleh menjadi sumber protein alternatif dengan komposisi nutrien yang tinggi. Belalang juta (*Locusta migratoria manilensis*) berpotensi dengan kandungan protein tinggi dan memenuhi syarat sebagai 'Halal' telah memenuhi pasaran Muslim. Tujuan kajian adalah untuk mengkaji perbezaan dalam komposisi proximat dan sifat fizikal antara serbuk belalang juta dari sumber berbeza. Kedua-dua serbuk belalang juta telah menjalani analisis proximat, penilaian warna, ketumpatan pukal, ketumpatan tertepuk, aliran dan indeks kebolehmampatan. Terdapat perbezaan ketara ($p < 0.05$) dalam komposisi pemakanan antara dua sumber serbuk belalang juta. Kandungan protein untuk sampel 1 dan 2 adalah 81.4 dan 39.7% masing-masing manakala 6.0 dan 23.4% untuk kandungan lemak masing-masing kerana tahap pertumbuhan belalang juta yang berbeza. Perbezaan ketara ($p < 0.05$) dalam analisis warna bahawa sampel 2 mempunyai kecerahan dan kekuningan yang lebih rendah daripada sampel 1 kerana suhu pengeringan gelombang mikro yang tinggi diaplikasikan pada sampel 2. Sampel 1 mempunyai ketumpatan pukal dan ketumpatan tertepuk yang lebih rendah ($p < 0.05$) berbanding dengan sampel 2 kerana ketinggalan lubang berliang selepas pengeringan sejuk beku yang digunakan pada sampel 1. Sementara itu, kedua-dua serbuk belalang juta ditentukan sebagai serbuk aliran lemah berdasarkan kadar aliran dan indeks kebolehmampatan disebabkan kandungan kelembapan yang tinggi and saiz zarah yang kecil. Kajian ini menunjukkan sumber sampel

yang berbeza mempengaruhi komposisi, warna, ketumpatan pukal dan ketumpatan tertepuk. Limitasi dalam kajian ini adalah kegunaan sumber belalang juta yang berlainan dengan tahap pertumbuhan yang berbeza menyebabkan pengaruh kaedah pengeringan terhadap komposisi pemakanan serbuk belalang juta tidak dapat dikaji. Berdasarkan hasil yang diperolehi, sampel 1 lebih diutamakan dengan warna yang lebih cerah, kandungan protein yang lebih tinggi dan kandungan lemak yang lebih rendah mempunyai potensi tinggi dalam aplikasi makanan dan menjadi pilihan pengguna.

COMPARISON ON COMPOSITION AND PHYSICAL PROPERTIES OF DRIED LOCUST (LOCUSTA MIGRATORIA MANILENSIS) POWDER FROM DIFFERENT SOURCES.

ABSTRACT

Current conventional livestock are no longer sufficient for human consumption in the future due to the increase food demand as global population increasing. Entomophagy could be an alternative protein source with high nutrient composition. Locust (*Locusta migratoria manilensis*) has the potential with high protein content and qualified as 'Halal' that meets Muslim market. The aim of the study is to investigate the differences in proximate composition and physical properties between dried locust powder from two different sources. Both locust powders undergone proximate analysis, colour evaluation, bulk density, tapped density, flowability and compressibility index. Significant difference ($p<0.05$) in nutritional composition of locust powder from different sources whereby protein content for sample 1 and 2 were 81.4 and 39.7% respectively whereas 6.0 and 23.4% respectively for fat content due to different growth stage of locust. Significant difference ($p<0.05$) in colour analysis whereby sample 2 had lower lightness and yellowness than sample 1 due to high microwave drying temperature applied in sample 2. Sample 1 had significant ($p<0.05$) lower bulk and tapped density than sample 2 due to porous structure after freeze-drying treated in sample 1. Both samples were determined as poor flow powder based on flowability and compressibility index due to fine particle size and high moisture content. The study revealed different sample sources do impact on the composition, colour, bulk and tapped of locust powder. Limitation of this study was using different source of locust with different growth stage which resulting in unable to determine the effect of drying method on nutritional composition of locust powder. Based

on the results obtained, sample 1 is preferred as it had lighter colour, higher protein content and lower fat content which more preferably in food application and consumer preference.