PRODUCTION OF PROTEIN HYDROLYSATES FROM SOY OKARA BY *RHIZOPUS OLIGOSPORUS*

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JUNE 2020

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Saya telah menyemak semua pembetulan/pindaan yang dilaksanakan oleh ~~Encik/Puan~~/Cik _UMMI SYAKINA BINTI SULAIMAN

Mengenai disertasinya sebagaimana yang dipersetujui oleh Panel Pemeriksaan di Viva Vocenya.

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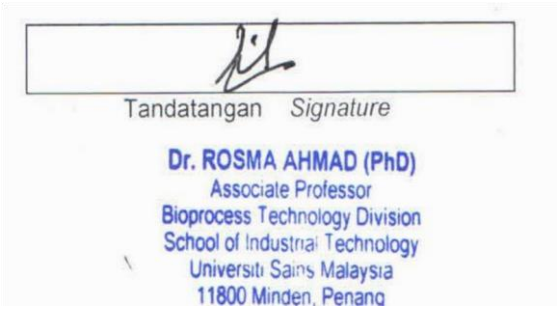
Sekian, terima kasih.



16/07/2020

Tarikh

PRODUCTION OF PROTEIN HYDROLYSATES FROM SOY OKARA BY *RHIZOPUS OLIGOSPORUS*

by

UMMI SYAKINA BINTI SULAIMAN

A dissertation submitted in the partial fulfilment of the requirements for the degree of Bachelor of Technology (B. Tech) in the field of Bioprocess Technology
School of Industrial Technology
Universiti Sains Malaysia

June 2020

DECLARATION BY AUTHOR

The 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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ACKNOWLEDGEMENT

Firstly, I am grateful to Allah, the Most Gracious and Merciful, give me strength, spirits and ability to complete this final year project. My deepest appreciation and special thanks to my supervisor, Prof. Dr Rosma Binti Ahmad for motivation, immersed knowledge and continuous support of my study and research. Not to forget, my sincere thanks also goes to other lecturers for their advices and guidance during research project and thesis writing.

Thank you to lab assistants Mr Azmaizan Bin Yaakub and Madam Najmah Binti Hamid for their support and help providing materials and apparatus during research project. My appreciation also extends to my best friend, Wan Nurnadia Diyana Binti Sulaiman for always give me strength and support during conducting this project.

Last but not least, I would like to thank my family for giving me encouragement in completing this research project from beginning to the end.

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JUNE 2020

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LIST OF SYMBOLS AND ABBREVIATIONS

Symbol	Caption
ºC	Degree Celsius
R^2	Coefficient of Determination
O^2	Oxygen
%	Percentage
&	And
=	Equal
>	More than

Abbreviation	Caption
mL	Millilitre
Mg	Milligram
µg	Microgram
G	Gram
Kg	Kilogram
PDA	Potato Dextrose Agar
USA	United States of America
w/v	Weight Per Volume
w/w	Weight Per Weight
v/v	Volume Per Volume
SSF	Solid State Fermentation
H	Hour
Min	Minute
HCl	Hydrochloride

NaOH	Sodium Hydroxide
KH_2PO_4	Monopotassium Phosphate
M	Molar
SD	Standard Deviation

PENGHASILAN HIDROLISAT PROTEIN DARIPADA OKARA SOYA OLEH *RHIZOPUS OLIGOSPORUS*

ABSTRAK

Okara merupakan bahagian tidak larut yang didapati semasa pemprosesan penghasilan tofu dan susu soya. Ia dihasilkan dalam kuantiti yang banyak setiap tahun menyumbang kepada masalah pelupusan dan kelembapannya yang tinggi menyebabkan ia mudah rosak. Kebiasaannya, okara dilupuskan sebagai bahan terbuang mengakibatkan masalah persekitaran. Nilai pemakanannya berkurang kerana nutrien didalamnya tidak larut. Objektif kajian ialah menentukan penghasilan hidrolisat protein dari okara dengan cara fermentasi oleh *Rhizopus oligosporus.* Spesifiknya, untuk menentukan komposisi proksimat okara segar dan untuk menentukan kesan pembolehubah fermentasi (peratus inokula dan ketebalan substrat) okara oleh *R. oligosporus* ke atas pertumbuhan fungi dan pengeluaran asid amino. Fungi didapati dari tempe diguna terus sebagai inokula fermentasi. Okara dibiakkan oleh *R. oligosporus* dengan ketebalan substrat dan peratus inokula yang berbeza selama 72 jam pada 25℃ di dalam bilik gelap. Persampelan diambil setiap enam jam untuk analisa pertumbuhan fungi dengan kaedah glukosamin dan kandungan asid amino dengan menggunakan ujian ninhidrin. Okara segar mengandungi komposisi proksimat kandungan kelembapan 84.10%. Berdasarkan basis kering, terdapat 33.09% kandungan protein, 10.66% kandungan lemak, 0.60% kandungan abu dan 55.65% kandungan karbohidrat. Secara statistik, tidak ada perbezaan yang signifikan ($p>0.05$) ketebalan substrat (1 cm atau 3 cm) dengan 2.5% dan 5% inokula ke atas kandungan glukosamin dan asid amino. Kandungan maksima glukosamin ialah 0.203 mg pada 2.5% inokula dan 0.208 mg pada 5% inokula manakala asid amino pula ialah 85.4 µg pada 2.5% inokula and 94.5 µg pada 5% inokula.

PRODUCTION OF PROTEIN HYDROLYSATES FROM SOY OKARA BY *RHIZOPUS OLIGOSPORUS*

ABSTRACT

Okara is the solid non-soluble fraction obtained during tofu or soymilk production processes. It is rich in protein is produced in large quantity annually poses a significant disposal problem and its high moisture content cause it susceptible to microbial spoilage. It is usually disposed of as a waste and poses an environmental problem. Most of the nutrients in okara remain in the insoluble form, decreasing its nutritional value. The objective of this research project was to produce protein hydrolysate from soy okara by means of okara fermentation by *Rhizopus oligosporus*. The specifics objectives are to determine the proximate composition of fresh okara and to determine the effect of fermentation variables (percentage of inoculum and thickness of substrate) of okara by *R. oligosporus* on fungal growth and amino acid production. *R. oligosporus* obtained from *tempe* was directly used as inoculum for okara solid state fermentation. Okara was cultivated by *R. oligosporus* with different substrate thickness and percentage of inoculum for 72 hours at 25℃ in a dark room. Sampling was done for every six hours interval for growth analysis using glucosamine and amino acid content by using ninhydrin method. The proximate analysis for fresh okara was determined with moisture content of 84.10%. Based on dry basis, there were 33.09% protein content, 10.66% fat content, 0.60% ash content and 55.65% carbohydrate content of okara. Statistically, there was no significant difference of substrate thickness (1 cm or 3 cm) with 2.5% and 5% inoculum on glucosamine and amino acid content. The maximum glucosamine content was 0.203 mg at 2.5% inoculum and 0.208 mg at 5% inoculum while amino acid content was 85.4 µg at 2.5% inoculum and 94.5 µg at 5% inoculum.