

**PRODUCTION OF PROTEIN HYDROLYSATES
FROM SOY OKARA BY *ASPERGILLUS ORYZAE***

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PRODUCTION OF PROTEIN HYDROLYSATES FROM SOY OKARA BY *ASPERGILLUS ORYZAE*

by

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A dissertation submitted in the partial fulfilment of the requirements for the degree
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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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LIST OF SYMBOLS AND ABBREVIATIONS

Symbol	Caption
+	Plus
-	Minus
±	Plus-Minus
%	Percentage
°C	Degree Celcius
&	And
=	Equal
>	More than
Abbreviation	Caption
ml	Millilitre
mg	Milligram
g	Gram
kg	Kilogram
OD	Optical Density
PDA	Potato Dextrose Agar
SmF	Submerged Fermentation
SSF	Solid State Fermentation
USA	United States of America
w/v	Weight Per Volume
v/v	Volume Per Volume
SPSS	Statistical Package for the Social Sciences

**PENGHASILAN PROTEIN HIDROLISAT OLEH *ASPERGILLUS ORYZAE*
DARI OKARA KACANG SOYA**

ABSTRAK

Soya okara adalah sisa pulpa kacang soya atau hampas kacang soya yang diperoleh setelah menjalani proses pecahan air yang boleh digunakan untuk menghasilkan tauhu atau susu soya. Dalam industri soya, jumlah okara soya yang dihasilkan setiap hari lebih tinggi daripada yang dijangkakan yang mempunyai kandungan protein yang tinggi. Ia dapat meningkatkan pencemaran alam sekitar yang sangat rentan terhadap pembusukan pada okara segar. Hidrolisis protein okara disediakan dengan pembiakkan *Aspergillus oryzae* untuk menghasilkan protein berfungsi untuk makanan dan makanan haiwan. Dalam penyelidikan ini, okara akan dibiakkan dengan peratusan inokulum *A. oryzae* yang berbeza pada inkubasi 25°C selama 72 jam. Pengambilan sampel secara berkala setiap enam jam telah dilakukan dan sampel dianalisis untuk pertumbuhan fungi dengan kaedah glukosamin dan kepekatan asid amino menggunakan ujian ninhidrin. Kandungan kelembapan okara segar adalah 84.51%. Analisis anggaran okara secara kering adalah 33.09% (kandungan protein), 10.66% (kandungan lemak), 0.60% (kandungan abu), dan 55.65% (kandungan karbohidrat). Secara statistik, dengan menggunakan Uji Sampel Bebas, tidak ada perbezaan yang signifikan dengan nilai p 0.280 (2.5%) dan 0.147 (5.0%) untuk kandungan glukosamin sedangkan 0.684 (2.5%) dan 0.344 (5.0%) untuk kandungan asid amino dalam kesan okara untuk kedua-dua ketebalan 1 cm dan 3 cm. Fermentasi okara tidak dipengaruhi oleh ketebalan substrat (1 cm dan 3 cm) dengan 2.5% dan 5.0% inokulum. Kandungan glukosamin maksimum ialah 0.164 mg pada 2.5% dan 0.176 mg pada inokulum 5.0%. Kandungan asid amino tertinggi pada inokulum 2.5% ialah 84.6 µg dan 94.05 µg pada inokulum 5.0%.

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ABSTRACT

Soy okara is the soybean pulp or soybean curd residues that obtain after undergoing water-extractable fraction process used to produce bean curd or soymilk. In soy industry, the amount of soy okara produced every day is higher than expected which in high protein content. It can increase the environmental pollutions cause of highly susceptible to putrefaction in fresh okara. Okara protein hydrolysate is prepare by cultivation with *Aspergillus oryzae* to produce functional protein for foods and animal feeds. In this research, okara will be cultivated with different percentage of *A. oryzae* inoculum at 25°C incubation for 72 hours. Periodical sampling at every six hours has been carried out and samples was analysed for fungal growth by glucosamine method and amino acid concentration using ninhydrin test. Moisture content of fresh okara was 84.51%. Proximate analysis in dry basis okara was 33.09% (protein content), 10.66% (fat content), 0.60% (ash content), and 55.65% (carbohydrate content). Statistically, by using Independent Sample T-Test, there was no significant difference with the p-value 0.280 (2.5%) and 0.147 (5.0%) for glucosamine content whereas 0.684 (2.5%) and 0.344 (5.0%) for amino acid content in the effect of okara for both thickness of 1 cm and 3 cm. Okara fermentation was not affected by substrate thickness (1 cm and 3 cm) with 2.5% and 5.0% inoculum. The maximum glucosamine content was 0.164 mg at 2.5% and 0.176 mg at 5.0% inoculum. The highest amino acid content at 2.5% inoculum was 84.6 µg and 94.05 µg at 5.0% inoculum.