PRODUCTION OF PROTEIN-RICH POULTRY FEED INGREDIENT FROM DISCARDED GUAVA PEEL

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by

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APPROVAL AND DECLARATION SHEET

This project report titled Production of Protein-rich Poultry Feed Ingredient from Discarded Spinach was prepared and submitted by Norfatin Nabilah binti Muhamad (Matrix Number: 151283604) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Chemical Engineering Technology (Industrial Biotechnology) in Universiti Malaysia Perlis (UniMAP).

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PENGHASILAN BAHAN MAKANAN AYAM KAYA PROTEIN DARIPADA KULIT JAMBU BATU YANG DIBUANG

ABSTRAK

Kulit jambu terbuang sangat terdedah kepada hidrolisis oleh campuran enzim yang terdiri daripada selulolitik dan pektinolitik di mana ia memberikan prospek sebagai bahan baku untuk transformasi biologi kepada nilai tambah produk. Kulit jambu terbuang cukup kaya dengan vitamin dan mineral. *Aspergillus niger* telah dikaji tentang keupayaannya untuk memecahkan kulit jambu terbuang di bawah proses penapaian keadaan pepejal (SSF). Kajian ini menilai kesan parameter proses fermentasi seperti suhu dan waktu inkubasi pada biodegradasi kulit jambu terbuang ke biomas yang kaya protein menggunakan *A. niger* sebagai mikrob untuk penapaian. Sementara itu, kandungan fisiokimia (kandungan kelembapan dan bahan organik) dan pemakanan (kandungan protein) jus kulit jambu yang dibuang juga telah dikaji sebelum dan selepas proses penapaian. Selepas penapaian, konstituen fisiokimia dan nutrisi menunjukkan sedikit peningkatan dalam kuantiti. Pengeluaran biomas yang diperkayakan protein dari kulit jambu terbuang sebagai substrat dalam proses penapaian didapati dihasilkan pada jumlah yang lebih tinggi dengan suhu 40 ˚C dan 72 jam masa inkubasi dengan saiz inokulum sebanyak 10^6 spora / ml. Jumlah protein sebanyak 8% diperoleh dengan *A. niger* selepas penapaian. Penyiasatan ini telah mendedahkan potensi pengeluaran protein dari kulit jambu batu yang dibuang melalui proses penapaian keadaan pepejal.

ABSTRACT

Guava waste peel is highly prone to hydrolysis by mixtures enzymes which consists of cellulolytic and pectinolytic where give it prospective as feedstock for biological transformation to value added products. The peel of guava waste is quite rich in vitamins and minerals. *Aspergillus niger* was studied for their capability to break down guava waste peel under solid state fermentation (SSF) process. This study assessed the effects of fermentation process parameters such as temperature and incubation time on the biodegradation of guava waste peel into protein enriched biomass using *A. niger* as a microbe for fermentation. Meanwhile, the physiochemical (moisture content and organic matter) and nutritional (protein content) constituent of discarded guava peel was also has been studied before and after fermentation process. After fermentation, the physiochemical and nutritional constituents showed a slightly increase in the quantity. The production of protein enriched biomass from guava waste peel as a substrate in the fermentation process was found to be produced at higher amount by temperature of 40 ˚C and 72 hours of incubation time with inoculum size of 10^6 spores/ml. The greatest amount of protein of 8% was gained with *A. niger* after fermentation. This investigation has revealed the potential for production of protein from discarded guava peel via solid state fermentation process.

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LIST OF SYMBOLS

˚C	degree Celsius
g	gram
mg	milligram
ml	milliliter
cm	centimeter
mm	millimeter
min	minutes
h	hour
%	percent
l	liter
µl	microliter
M_D	mass of dry sample
M_C	mass of crucible
M_{CS}	mass of crucible sample
M_A	mass of ash
M_C	mass of crucible and ash
M_O	mass of organic matter

LIST OF ABBREVIATION AND NOMECLATURES

OFAT	One Factor at Time
PDA	Potato Dextrose Agar
MC	Moisture Content
OM	Organic Matter
SSF	Solid State Fermentation
TKN	Total Kjeldahl Method