

## **Acknowledgements**

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## Abstrak

Dalam bahagian pertama kajian ini, enam strains dari *Geomyces* spp. terpencil dari Kepulauan King George di Maritime Antartika digunakan untuk kitinase. Mulanya, mikrofungi hidup pada suhu 4°C dan 25°C pada pelbagai jenis pelat yang setiap satunya mengandungi 1% colloid kitin, 0.5% (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, 0.05% MgSO<sub>4</sub>.7H<sub>2</sub>O, 0.24% KH<sub>2</sub>PO<sub>4</sub>, 0.06% K<sub>2</sub>HPO<sub>4</sub>.3H<sub>2</sub>O dan 1.5% Agar. Koloni radius dan aktiviti hidrolitik akan diukur dan relatif aktiviti indeks (RA) terbentuk. Nilai relatif aktiviti pada suhu 25°C lebih tinggi berbanding dengan suhu 4°C. Hanya *Geomyces* sp. 5 (AKA7KGI102 R1-4) menunjukkan aktiviti kitinase yang penting pada kedua-dua suhu. Jelas, hidrolisis efektif terjadi pada suhu mesofilik. Kedua bagian, adalah kuantifikasi enzim dengan menumbuhkan strain yang dipilih pada mediumcair pada 25°C. Alunan dipilih adalah *Geomyces* sp.1 (AKA7KGI601 R3-1) dan *Geomyces* sp.5 (AKA7KGI102 R1-4). Kocok budaya labu dilakukan untuk memproduksi enzim kitinase menggunakan koloid kitin sebagai substrat referensi. Telah diamati bahwa protin konsentrasi dan N-asetilglukosamin produksi dari *Geomyces* sp.5 (AKA7KGI102 R1-4) lebih tinggi daripada dari *Geomyces* sp.1 (AKA7KGI601 R3-1). Pengoptimalan media kultur dijalankan bagi meningkatkan aktiviti enzim. Media dengan pH 6.5 menunjukkan aktiviti kitinase optimum dan suhu pengeraman 37°C mampu meningkatkan aktiviti kitinase.

Namun begitu, *Geomyces* spp. memiliki aplikasi untuk masa depan penelitian. Karena kemampuan untuk memproduksi kitinase pada berbeda suhu dapat bermanfaat dalam aplikasi berbagai bioteknologi.

## Abstract

The first part in this research, was screened six strains of *Geomyces* spp. isolated from King George Island in the Maritime Antarctica for chitinase enzyme. Initially, microfungi were grown at 4 °C and 25 °C on a series of plates each containing 1% colloid chitin, 0.5% (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, 0.05% MgSO<sub>4</sub>.7H<sub>2</sub>O, 0.24% KH<sub>2</sub>PO<sub>4</sub>, 0.06% K<sub>2</sub>HPO<sub>4</sub>.3H<sub>2</sub>O and 1.5% agar. Colony radius and hydrolytic activity were measured and a relative activity index (RA) constructed. Relative activity values at 25 °C were higher than at 4 °C. Only *Geomyces* sp. 5 (AKA7KGI102 R1-4) showed significant chitinase activity at both temperatures. Obviously, effective hydrolysis occurred at mesophilic temperatures.

Second part, is quantification of enzyme by growing the selected strains on liquid medium at 25 °C. The selected strains were *Geomyces* sp. 1 (AKA7KGI601 R3-1) and *Geomyces* sp. 5 (AKA7KGI102 R1-4). Shake flask culture was carried out to produce chitinase enzyme using colloid chitin as the reference substrate. It was observed that protein concentration and *N*-acetylglucosamine production from *Geomyces* sp. 5 (AKA7KGI102 R1-4) was higher than from *Geomyces* sp. 1 (AKA7KGI601 R3-1). Optimization of culture medium was conducted in order to enhance enzyme activity. Medium with pH 6.5 exhibited the optimum chitinase activity and incubation temperature at 37 °C increase chitinase activity.

However, potential *Geomyces* spp. have a great interest for used in future research. For its ability to produce chitinase at different temperatures it could be valuable in various biotechnological application.

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## Symbols and Abbreviations

%	Percentage
(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	Ammonium sulphate
°C	Degree Centigrade
CCFEE	Culture Collection of Fungi from Extreme Environments
CMC	Carboxymethyl Cellulose
COs	Chitioligosacchrides
DNS	Dinitrosalicylic acid
g	Gram
GPS	Global Positioning System
HCL	Hydrogen chloride
K <sub>2</sub> HPO <sub>4</sub>	Dipotassium phosphate
KCTC	Korean Collection for Type Cultures
KH <sub>2</sub> PO <sub>4</sub>	Monopotassium phosphate
L	Litre
LMWC	Low Molecular Weight Chitioligomers
mg	Milligram
mg/ml	Milligram per millilitre
MgSO <sub>4</sub> ·7H <sub>2</sub> O	Hydrated magnesium sulfate
min	Minute
MW	Molecular Weight
Na metabisulfite	Sodium metabisulfite
NAG	N-Acetylglucosamine

$\text{NaKC}_4\text{H}_4\text{O}_6$	Rochelle salt
NaOH	Sodium hydroxide
PDA	Potato Dextrose Agar
pH	Hydrogen potential
RA	Relative Activity
rpm	Rotation per minute
SCP	Single Cell Protein
sp	Species
$\mu\text{g}$	Microgram
$\mu\text{l}$	Microliter
w/v	Weight per volume
ml	Mililitre
mm	Milimetre
nm	Nanometre