Optimization of *kojic acid* production from *aspergillus flavus* and *aspergillus oryzae* in submerge fermentation

Submitted By

Samiya Yaqub
ID: 15001254010

SUPERVISOR:
Dr. Tanveer Akber

Department of Life Sciences
School of Science
University of Management and Technology,
Lahore, Pakistan
2017

OPTIMIZATION OF *KOJIC ACID* PRODUCTION FROM *ASPERGILLUS FLAVUS* AND *ASPERGILLUS ORYZAE* IN SUBMERGE FERMENTATION

Submitted to University of Management and Technology Lahore

In partial fulfillment of the requirements

for the award of degree of

MS
BIOTECHNOLOGY

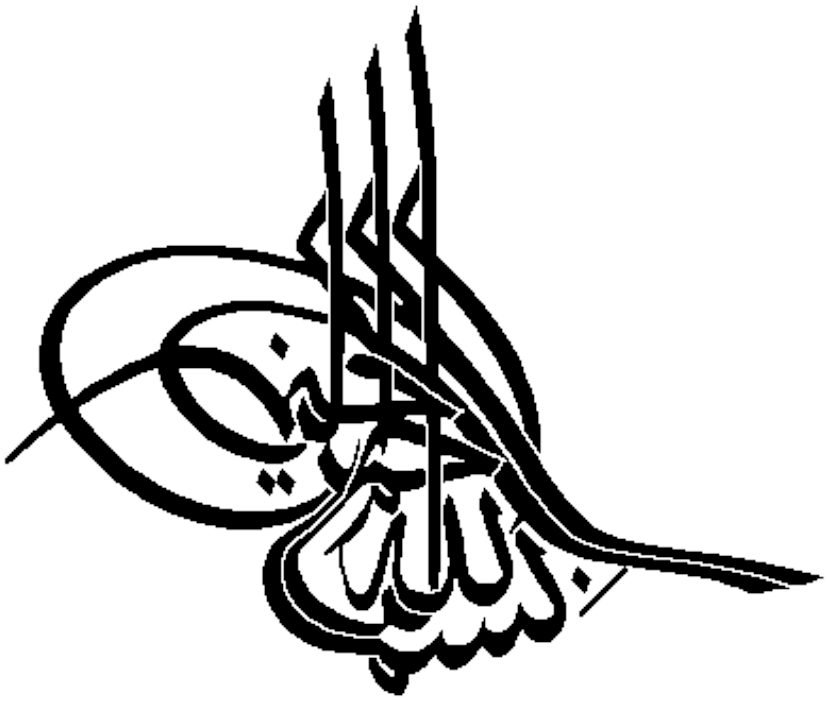
BY
SAMIYA YAQUB

ID

1	5	0	0	1	2	5	4	0	1	0

SESSION: 2015-2017

Department of Life Sciences
School of Science
University of Management and Technology,
Lahore, Pakistan



In the name of

Allah,

The most Compassionate,

The most merciful

DECLARATION

I SAMIYA YAQUB, D/O MUHAMMAD YAQUB MEHBOOB ID: 15001254010 Session **2015-2017** aware of and understand the university's policy on plagiarism and I certify that this thesis titled **"Optimization of *Kojic acid* production from *Aspergillus flavus* and *Aspergillus oryzae* in submerge fermentation"** is my own work, expect where indicated by referencing, and the work presented in it has not been submitted in support of another degree or qualification from this or any other university or institute of learning.

All experimental work belong to me; the collaborative contributions have been indicated clearly and acknowledged. Due references have been provided on all supporting literatures and resources.

Dated: _____ _____

( )

DEDICATION

I dedicate

My work to

***Allah Almighty** first*

*And then to my beloved **Parents** and my **Chachu***

for their endless support during my whole educational career.

ACKNOWLEDGEMENT

All the praises are for **ALMIGHTY ALLAH**, who is the most beneficent and merciful. I want to thanks **ALMIGHTY ALLAH**, who created this universe and bestowed the mankind and me with knowledge and wisdom. **HE** invigorates me with the ability to accomplish this task of research work and to contribute a drop to the existing ocean of scientific knowledge.

Trembling lips and wet eyes to praise for **PROPHET MUHAMMAD (S.A.W.W)** the city of knowledge, torch of guided who guided His ummah to the knowledge from cradle to grave. The preaching and examples set by our **HOLY PROPHET MUHAMMAD (S.A.W.W)** will remain forever source of guidance for Muslims and whole humanity.

It's a truth that I really have no words to say thanks to **Dr. Tanveer Akber,** for the continuous encouragement and also for helpful suggestions and deeds during my research work. I will never be able to say thanks for her guidance not only during my research work but also during my study years.

I would like to pay my full regards to my co-suppervisor **Dr. Yasir saleem** senior scientific officer at PCSIR Lahore, and **Mrs. Shaista Yasir** who always encouraged and helped me during the course of this research work at meat lab PCSIR Lahore.

I wish to express my sincere thanks to **Dr. Noman Rasool** chairman of Life Sciences department University of Management and Technology Lahore, and also my supervisor, for providing me with a great opportunity to do my research and for his ultimate guidance in becoming a disciplined lab worker.

I would not be able to find words in order to express my deepest gratitude and to acknowledge the efforts of my worthy teacher **Dr. Zahra Noreen**, Assistant Professor of Botany University of Education Township Lahore. She is just brilliant in her field of study, who helped me a lot.

I would like to express my deepest thanks to PCSIR faculty for helping me in my work **Dr. Zaheer** pharmaceuticals department, **Dr. Abdul Ahid Rasheed** FBRC Dairy lab PCSIR.I cannot forget to say thanks to **Mrs. Shaista Yasir** Meat lab PCSIR.

I would also like to say special thanks to Sir **Arshad Sindhu** Leather department PCSIR. I would like to say special thanks to my brother **Naeem Yaqub** and best friends **Tanzeela Ibrahim, Qurrat ul Ain, Muqadas Khalil, Anam Ilyas** last but not least superior acknowledgment for **Mr. Abrar Saeed and Mrs. Afifa Abrar** who were always with me all the time to support me and to help me.

ABSTRACT

Kojic acid is an organic acid obtained from various species of *Aspergillus* through fermentation. Its demand is very high in cosmetic industries as it is a good alternate of carcinogenic Hydroquinone. Beside its cosmetic use and importance, it has grabbed a vital position in Pharmaceuticals, Food and Agriculture industries. Current study was designed for production and purification of *Kojic acid* crystals from local *Aspergillus* species, *Aspergillus flavus* and *Aspergillus oryzae*. The effect of pH, temperature, static and non-static (shaker) condition on *Kojic acid* yield in submerge fermentation was examined. Significant yield of *Kojic acid* crystal was obtained by *A. flavus* as compared to *A. oryzae*. Optimized conditions were pH 4.5 for (*A. flavus*), pH 3.5 for (*A. oryzae*), temperature 30 ^{0}C, 20 days incubation period.

We have found that high yield of *Kojic acid* crystals are produced under static condition (16 gram per litter in *A. flavus* and 11 gram per litter in *A.oryzae*) as compared to non- static (shaker) conditions (6 gram per litter in *A. flavus* and 5 gram per litter in *A. oryzae).* Quantitative estimation of *Kojic acid* was done by Bentley's colorimetric method and conformation through TLC and HPLC. We were successful to get high yield of *Kojic acid* under optimized conditions.

Preface

Table of Contents

List of Figures

List of Tables

INTRODUCTION

1.1*Kojic acid*:

Kojic acid is an organic chelation Agent used as decolorizing agent. It is well-known for its use in Cosmetics Industry. Besides its cosmetic importance, it has grasped a significant position in Food, Agriculture, Health care and Pharmaceuticals etc. (Bentely, 2006). K. Saitio, a Japanese scientist discovered *Kojic acid* in 1907 from the mushroom present on steamed rice. Koji stands for rice in Japanese language and likewise the name of *Kojic acid* was given to this acid by Yabuta in 1913