

# **Cultivation of *Pleurotus Ostreatus* using Alternative Substrate**

**A Dissertation Submitted to  
Central Department of Botany, Tribhuvan University  
for the Partial Fulfillment of the Requirement for  
Masters of Science in Botany**

**Submitted by:  
Anand Prakash Joshi  
Exam Roll no.: 273  
Class Roll no.:29  
Batch: 064/065  
T.U. regd. No.:5-3-28-81-2006**

**Central Department of Botany  
Tribhuvan University  
Kritipur, Kathmandu  
2011**

**TRIBHUVAN UNIVERSITY**  
**INSTITUTE OF SCIENCE AND TECHNOLOGY**  
**CENTRAL DEPARTMENT OF BOTANY**  
**KIRTIPUR, KATHMANDU, NEPAL**

**RECOMMENDATION**

This is to certify that **Mr. Anand Prakash Joshi** has carried out the dissertation work entitled “**Cultivation of *Pleurotus ostreatus* using alternative substrate**” under my supervision. This result has not been submitted elsewhere for any other academic degree. I, therefore, recommend this dissertation for the partial fulfillment of Master’s Degree in Botany from **Tribhuvan University, Nepal**.

.....  
Dr. Chandra Prasad Pokhrel

(Supervisor)  
Central Department of Botany  
Tribhuvan University  
Kirtipur, Nepal

**Date of submission: 15<sup>th</sup> June, 2011**

# TRIBHUVAN UNIVERSITY

## INSTITUTE OF SCIENCE AND TECHNOLOGY

### CENTRAL DEPARTMENT OF BOTANY

KIRTIPUR, KATHMANDU, NEPAL

## LETTER OF APPROVAL

The dissertation paper submitted by Mr. Anand Prakash Joshi entitled “Cultivation of *Pleurotus ostreatus* using alternative substrate” has been accepted as the partial fulfillment of the M.Sc. Degree of Botany.

## EXAMINATION COMMITTEE

.....  
**Supervisor**

Dr. Chandra Prasad Pokhrel  
Central Department of Botany  
Tribhuwan University  
Kirtipur, Kathmandu

.....  
**Head of Department**

Prof. Dr. Pramod Kumar Jha  
Central Department of Botany  
Tribhuwan University  
Kirtipur, Kathmandu

.....  
**External Examiner**

Dr. Giri Raj Tripathi  
Central Department of Biotechnology  
Tribhuwan University  
Kirtipur, Kathmandu

.....  
**Internal Examiner**

Prof. Dr. Usha Budhathoki  
Central Department of Botany  
Tribhuwan University  
Kirtipur, Kathmandu

**Date of Examination: 21<sup>th</sup> of July 2011**

## ACKNOWLEDGEMENTS

In an attempt to prepare a thesis on “*cultivation of Pleurotus ostreatus using Alternative substrate*”, I have been supported with apt guidance, scholastic inspirations and needy facilities by my supervisor *Dr. Chandra Prasad Pokhrel, Lecturer at the Central Department of Botany, Tribhuvan University, Kirtipur.*

I am deeply thankful to *Dr. Krishna Kumar Shrestha, Professor and Head of Central Department of Botany, T.U.* for providing necessary provisions and laboratory facilities for my dissertation. I am also grateful to *Dr. Usha Budhathoki, Professor of Central Department of Botany, T.U., Kirtipur* for her support and guidance. I would like to express my gratitude to *Mr. Shiva Devkota, Assistant Lecturer of the Central Department of Botany, T.U., Kirtipur* for his suggestions and recommendations during my thesis project.

This thesis prepared by me wouldn't have been a complete one without the support of my colleagues, friends, faculty members and peers. I have to mention that I am overwhelmingly thankful to my brothers *Mr. Rajendra Joshi* and *Mr. Kapil Pandey* for being there throughout my thesis project compilation.

And I can't forget the immense nurturance of my loving parents who have made me capable of being a university graduate. I joyously thank them for their support and undying love.

.....

**ANAND PRAKASH JOSHI**

## ABSTRACT

The research experiment was carried out to investigate the cultivation of *Oyster mushroom, Pleurotus ostreatus* on different residues such as corn cob, paper waste, and grass waste. The experiment was conducted with an objective to find out low cost substrate and supplement for the cultivation of *Pleurotus ostreatus*. The data was analyzed on various aspects like mycelium growth, colonization, and appearance of pinhead, mushroom yield, biological efficiency, size and number of fruiting bodies. Mycelial extension was also measured weekly during spawn running. Altogether nine treatments of mixture of selected substrates with supplement were tested. The treatments were grass waste, paper waste and corn cob mixed with chicken manure, rice bran and also was left alone. The study results showed that corn cob is the best among all the substrates when it is supplemented with rice bran.

## TABLE OF CONTENTS

Page No.

### ***ACKNOWLEDGEMENTS***

### ***ABSTRACT***

<b>1. CHAPTER ONE: INTRODUCTION</b>	<b>1-9</b>
1.1 Oyster mushroom.	4
1.2 Pleurotus ostreatus.	5
1.3 Nutritional Value of Mushroom.	5
1.4 Medicinal Value of Mushroom.	6
1.5 Significance of Mushroom cultivation.	7
1.6 Objectives, justification and limitations.	8
1.6.1 Objective of the study.	8
1.6.2 General objectives.	8
1.6.3 Specific objectives.	8
1.7 Justification of the study.	8
1.8 Limitation of the study	9
<b>2. CHAPTER TWO: LITERATURE REVIEW</b>	<b>10-13</b>
<b>3. CHAPTER THREE: MATERIALS AND METHODS</b>	<b>14-16</b>
3.1 Mushroom spawn.	14
3.2 Preparations of substrates.	14
3.3 Spawning.	15
3.4 Incubation and fruiting.	15
3.5 Harvesting and yield.	15
3.6 Data recorded.	15
3.7 Size of mushroom.	16
3.8 Biological efficiency.	16

<b>4. CHAPTER FOUR: RESULTS</b>	<b>17-24</b>
4.1 Mycelial development period	17
4.1.1 Comparison of weekly mycelial growth of <i>Pleurotus ostreatus</i> on different substrates	18
4.1.2 Comparison of colonization period, primordial formation and first harvest days of <i>Pleurotus ostreatus</i> on different substrates	19
4.2 Number of fruiting bodies and size of mushroom	20
4.2.1 Numbers of fruiting bodies in the first and second flush of <i>Pleurotus ostreatus</i> on different substrates	21
4.2.2 Size of <i>Pleurotus ostreatus</i> on different substrates (mean $\pm$ SD)	22
4.3 Yield of fruiting bodies	22
4.3.1 Biological efficiency of <i>Pleurotus ostreatus</i> on different substrates	23
4.3.2 Yield of first and second harvest of <i>Pleurotus ostreatus</i> on different substrates	24
<b>5. CHAPTER FIVE: DISCUSSION</b>	<b>25-27</b>
5.1 Effect of spawn running	25
5.2 Fruiting bodies formation	26
5.3 Yield of mushroom	27
<b>6. CHAPTER SIX: CONCLUSION AND RECCOMENDATIONS</b>	<b>29-</b>
6.1 Conclusions	29
6.2 Recommendations	29

**REFERENCES**

**PHOTO PLATES**

## LIST OF TABLES

<b>Table 1:</b>	Comparison of weekly mycelial growth of <i>Pleurotus ostreatus</i> on different substrates (mean±SD, n= number of replicates)	18
<b>Table 2:</b>	Comparisons of colonization period, primordial formation and first harvest days of <i>Pleurotus ostreatus</i> on different substrates (mean±SD, n= number of replicates)	19
<b>Table 3:</b>	Number of fruiting bodies in the first and second flush of <i>Pleurotus ostreatus</i> on different substrates (mean±SD, n= number of replicates)	21
<b>Table 4:</b>	Size of <i>Pleurotus ostreatus</i> on different substrates (mean±SD)	22
<b>Table 5:</b>	Biological efficiency of <i>Pleurotus ostreatus</i> on different substrates(mean±SD)	23
<b>Table 6:</b>	Comparison between yield of first and second harvest in different substrates(mean±SD, n= number of replicates)	24



## ABBREVIATIONS

BE	=	Biological Efficiency
CAT	=	Centre for Agriculture Technology
CDB	=	Central Department of Botany
Gm	=	Gram
NARC	=	Nepal Agricultural Research Council
PPD	=	Plant Pathology Division
Spp.	=	Species (plural)
°C	=	Degree Centigrade
%	=	Percentage