

**RELATED ENZYMATIC ACTIVITIES IN SOLID-SUBSTRATE
FERMENTATION OF SAGO HAMPAS WITH**
Pycnoporus sanguineus

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ABSTRACT

Solid substrate fermentation (SSF) of sago pith residue known as 'hampas' with *Pycnoporus sanguineus* for enzyme production was carried out. Good growth of *Pycnoporus sanguineus* in SSF was noted on 'hampas' supplemented with 0.38% urea, 0.2% KH_2PO_4 and 0.05% $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ over a period of 30 days. Xylanase, lignin peroxidase and laccase activities were detected in *Pycnoporus sanguineus* cultures. Maximum xylanase and laccase activities of 5.26U/g of substrate on day 10 of SSF and 14.35U/g on day 15 of SSF of substrate were obtained respectively. The lignin peroxidase activity was less pronounced with an activity of 1.31U/g of substrate on day 10 of SSF.

An increase of 14.3% in xylanase activity and 5.9% in laccase activity were detected in cultures supplemented with urea of 0.57% (w/v) and 0.76% (w/v) respectively. With the 0.57% (w/v) of urea the xylanase activity reached a maximum of 6.01U/g of substrate on day 15 of SSF and with the 0.76% (w/v) of urea the laccase activity reached a maximum of 15.20U/g of substrate on day 15 of SSF.

Further investigation using optimum nitrogen levels showed that the xylanase and laccase activities were influenced by the inoculum age and density (w/w: weight of inoculum / weight of substrate) over a 20 days period of SSF. With 3-week-old inoculum the xylanase activity increased to 6.32U/g of substrate on the 10th day of fermentation. This activity is 20.2% more than the maximum activity of 5.26U/g obtained using the second week old inoculum. With the 3-week-old inoculum the laccase activity increased to 18.05 U/g of substrate on 10 day of SSF. This activity is 25.8% more compared to the maximum activity of 14.35 U/g of substrate obtained with 2-week-old inoculum on 15 day of SSF.

On the basis of these results, enzyme productivity by *Pycnoporus sanguineus* and possible utilization strategies of 'hampas' were proposed and discussed.

CONTENTS

	Page
ACKNOWLEDGEMENT	i
ABSTRACT	ii
CONTENTS	iii
LIST OF FIGURES	vi
LIST OF PLATES	viii
LIST OF TABLES	ix
LIST OF ABBREVIATIONS	x
CHAPTER ONE	1 - 6
INTRODUCTION	
CHAPTER TWO	7 - 44
LITERATURE REVIEW	
LIGNOCELLULOSE	7
Lignin	
Cellulose	
Hemicellulose	
Lignocellulosic utilization	
MICROBIAL UTILIZATION OF LIGNOCELLULOSICS	9
<i>Pycnoporus sanguineus</i>	
LIGNOCELLULOLYTIC ENZYMES	19
Lignin-degrading enzymes	
Cellulose- degrading enzymes	
Xylan- degrading enzymes	
SOME APPLICATIONS OF LIGNOCELLULOLYTIC SYSTEMS	30
SOLID-STATE FERMENTATION	32
SOLID-STATE FERMENTATION FOR ENZYME PRODUCTION	41

CHAPTER THREE	45 - 65
ENZYME ACTIVITIES DURING LIGNOCELLULOSIC DEGRADATION	
INTRODUCTION	45
MATERIALS AND METHODS	46
Substrate	
Inoculum	
Solid- state fermentation	
Extraction of crude extracellular enzymes	
Analysis	
RESULTS AND DISCUSSION	53
pH variation	
Soluble protein	
Xylanase activity	
Lignin peroxidase activity	
Laccase activity	
CONCLUSION	65
CHAPTER FOUR	66-89
EFFECT OF (a) NITROGEN CONCENTRATION AND (b) INOCULUM AGE AND DENSITY (W/W) ON LACCASE PRODUCTIVITY DURING SSF OF 'HAMPAS'	
INTRODUCTION	66
MATERIALS AND METHODS	68
Substrate	
Inoculum	
Culturing conditions	
Effect of nitrogen levels on enzyme production during SSF	
Effect of inoculum age and density on enzyme production in SSF	
Extraction of crude culture extract	
Analysis	
RESULTS AND DISCUSSION	71
Effect of nitrogen	
pH variation	
Soluble protein	
Xylanase activity	
Lignin peroxidase activity	
Laccase activity	

Effect of inoculum age and density (w/w)	
pH variation	
Soluble protein	
Xylanase activity	
Lignin peroxidase activity	
Laccase activity	
CONCLUSION	88
CHAPTER FIVE	
ENZYME PRODUCTIVITIES DURING LIGNOCELLULOSIC DEGRADATION	
UNDER OPTIMIZED PARAMETERS	90-102
INTRODUCTION	90
MATERIALS AND METHODS	91
Substrate	
Inoculum	
Fermentation	
Analysis	
RESULTS AND DISCUSSION	93
pH variation	
Soluble protein	
Xylanase activity	
Lignin peroxidase activity	
Laccase activity	
CONCLUSION	102
CHAPTER SIX	103-110
GENERAL DISCUSSION AND CONCLUSION	103
RECOMMENDATIONS FOR FURTHER WORK	109
CONCLUSION	110
REFERENCES	111-125
APPENDIX A: ANALYTICAL TECHNIQUES	126
APPENDIX B: BUFFERS AND MEDIA	134
APPENDIX C: DATA AND STATISTICAL TABLES	135

LIST OF FIGURES

Figure 1.1	Utilization of sago starch	2
Figure 1.2	Sago processing at a conventional factory and by-products generated	4
Figure 2.1	Useful products derived from lignocellulosic materials	10
Figure 2.2	Recycling of agro-residues	15
Figure 2.3	Principal steps in solid-state fermentation	33
Figure 3.1	Flow chart of the <i>P. sanguineus</i> Koji development using sterilized wheat grains	49
Figure 3.2	Procedure for sampling analysis and enzyme assay during SSF of <i>Hampas</i>	52
Figure 3.3	Variation of pH in crude culture extract	56
Figure 3.4	Soluble protein content of crude culture extract	58
Figure 3.5	Xylanase activity of crude culture extract	60
Figure 3.6	Lignin peroxidase activity of crude culture extract	62
Figure 3.7	Laccase activity of crude culture extract	64
Figure 4.1	Variation of pH in crude culture extract	74
Figure 4.2	Soluble protein content of crude culture extract	74
Figure 4.3	Xylanase activity of crude culture extract	76
Figure 4.4	Lignin peroxidase activity of crude culture extract	78
Figure 4.5	Laccase activity of crude culture extract	78
Figure 4.6	Variation of pH in crude culture extract	80
Figure 4.7	Soluble protein content of crude culture extract	82
Figure 4.8	Xylanase activity of crude culture extract	84

Figure 4.9	Lignin peroxidase activity of crude culture extract	85
Figure 4.10	Laccase activity of crude culture extract	87
Figure 5.1	Variation of pH in crude culture extract	94
Figure 5.2	Soluble protein content of crude culture extract	96
Figure 5.3	Xylanase activity of crude culture extract	98
Figure 5.4	Lignin peroxidase activity of crude culture extract	99
Figure 5.5	Laccase activity of crude culture extract	101
Figure 6.1	Proposed integrated system for utilization and treatment of sago starch processing wastes	108

LIST OF PLATES

Plate 3.1	Sago 'hampas' used in the experiment	48
Plate 3.2	<i>Pycnopus sanguineus</i> on PDA plate (seven day old culture)	48
Plate 3.3	Colonization of 'hampas' by <i>Pycnopus sanguineus</i>	54
Plate 4.1	Growth of <i>Pycnopus sanguineus</i> on 'hampas'	72

LIST OF TABLES

Table 2.1	Constituents of <i>Pycnoporus sanguineus</i> and their approximate concentration	17
Table 2.2	Extracellular enzymes of basidiomycetes and mode of action on lignocellulose	21
Table 2.3	Enzymes involved in the conversion of biomass	31
Table 2.4	Industrial applications of enzymes produced by SSF	43
Table 3.1	Initial contents of flask	50
Table 4.1	Proximate analysis of sago 'hampas'	67
Table 4.2	Nitrogen levels tested in the experiment	69
Table 4.3	Experimental design for the SSF of <i>hampas</i> with <i>Pycnoporus sanguineus</i>	70
Table 5.1	Variation in SSF of sago <i>hampas</i> with <i>P. sanguineus</i> using unoptimized and optimized parameters	92

LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
A_w	Water activity
BOD	Biological Oxygen Demand
C: N	Carbon: Nitrogen
COD	Chemical Oxygen Demand
DNS	Dinitrosalicylic Acid
h	hour
L	Liter
MW	Molecular Weight
NPU	Net Protein Utilization
nm	nanometer
OPFPt	Oil Palm Frond Parenchyma Tissue
PDA	Potato Dextrose Agar
PI	Isoelectric Point
POSS	Palm Oil Sludge Solids
psi	Pounds per Square Inch
rpm	Revolution per Minute
SSF	Solid Substrate Fermentation
v/w	Volume per weight
w/w	Weight per weight
λ	Wavelength
μmole	Micromole