



TABLE OF CONTENT

ACKNOWLEDGEMENT	I
LIST OF TALBES	VI
LIST OF FIGURES	VII
ABBREVIATIONS	X
1. LITERATURE REVIEW AND OBJECTIVES	
I Introduction	
1.1 Fungi	1
• Fungi physiology	1
• Wood rot fungi	3
1.2 Lignin	9
1.3 Lignin structure	10
1.4 Lignin degradation by white rot fungi	13
1.5 Enzymology of white rot fungi	15
• Lignin peroxidase (LiP)	17
• Manganese Peroxidase (MnP)	18
• Laccase	21
1.6 Bioremediation	25
1.7 Xenobiotic compounds	27
• Dyes	28
• Dye classification	29
• Azo dyes	32
• Dyes and environmental concern	33
1.8 Fungi in Bioremediation	35
II. Objectives	37
2. MATERIALS AND METHODS	
2.1 Collection and Isolation of fungi	38
2.2 Optimisation of growth media	39

2.3 Screening of white rot fungi	39
2.4 Chemicals	40
2.5 Experimental methods	41
2.5.1 Measuring ligninolytic activity of fungi using dye decolourisation method	41
2.5.1.1 Solid plate decolourisation	41
• Effect of carbon and nitrogen sources on solid plate decolourisation	42
• Influence of inoculum size on solid plate decolourisation	42
2.5.1.2 Decolorization in liquid growth medium	43
• Analytical methodology	43
• Effect of carbon and nitrogen sources on liquid growth medium decolourisation	44
• Influence of inoculum size on the liquid growth medium decolourisation	44
2.5.2 Determination of enzymatic activity	45
2.5.2.1 Production of ligninolytic activities by solid state Fermentation	45
• Optimisation of fermentation process under Solid State Fermentation	45
• Enzyme production and harvestation	46
2.5.2.2 Enzyme assay	46
2.5.3 Partial purification	47
2.5.4 Molecular weight determination	49
2.5.5 Effect of physic-chemical factors on enzyme production	51
2.5.6 FTIR (Fourier Transform Infrared Spectroscopy)	52
2.6 Histological studies	52
2.6.1 Naturally infected samples	52
2.6.2 Wood samples and decay test	53

3. RESULTS AND DISCUSSION	54
I. Biochemical and Enzymatic study	54
3.1 Collection and Isolation of the fungi	54
3.2 Screening of White rot fungi	55
3.3 Measuring fungal ligninolytic activity using dye decolourisation method	55
3.3.1 Solid plate decolourisation	55
3.3.2 Decolorization in liquid growth medium	62
3.3.3 Effect of carbon and nitrogen sources on decolorization	64
3.3.4 Influence of inoculum size on decolourisation	67
3.4 Determination of enzyme activity	68
3.4.1 Production of ligninolytic enzyme activities by solid state fermentation	68
3.4.1.1 Optimisation of different solid substrates	70
3.4.1.2 Optimisation of particle size	72
3.4.1.3 Optimisation of incubation time	73
3.4.2 Production profile of ligninolytic enzymes	75
3.4.3 Molecular weight determination	78
3.5 Effect of Physico-chemical factors on enzyme activity	79
3.5.1 Influence of reaction time	80
3.5.2 Influence of pH	80
3.5.3 Influence of incubation temperature	81
3.5.4 Influence of metal ions	83
3.6 FTIR (The Fourier Transform Infrared Spectroscopy)	85
II. Histological study	86
3.7 Results	86
3.7.1 <i>Alianthus excelsea</i> Roxb.	86
3.7.2 <i>Azadirachta indica</i> (L.) Del.	89
3.7.3 <i>Tectona grandis</i> L.f.	94
3.8 Discussion	100
4. REFERENCES	157