LIST OF FIGURES

| Figure no. | Title | Page number |
|------------|---|----------------|
| Figure 1 | Blast infected rice plants. | 4 |
| Figure 2 | Disease cycle of <i>M. grisea</i> . | 7 |
| Figure 3 | Laccase-catalysed oxidation of phenolic groups of lignin. | 18 |
| Figure 4 | A ball-and-stick model of Coprinus cinereus laccase. | 24 |
| Figure 5 | Crystallographic structure of the Cu-2 depleted laccase for <i>Coprinus cinereus</i> . | 26 |
| Figure 6 | β-barrel (A) and $β$ -sandwich (B) conformations of <i>Coprinus cinereus</i> laccase. | 28 |
| Figure 7 | The laccase-catalysed oxidation of ABTS to a cation radical. | 51 |
| Figure 8 | The laccase-catalysed oxidation of syringaldazine to its corresponding quinine. | 52 |
| Figure 9 | The phylogenetic analysis of 12 multicopper oxidase genes at protein level. | 73 |
| Figure 10 | Relative expression of 12 multicopper oxidases in <i>M. grisea</i> in normal and nitrogen starvation. | 74 |
| Figure 11 | Construction of expression vector pEG (KT)MgLac1. | 75 |
| Figure 12 | Construction of expression vector pEG (KT)MoLac2. | 76 |
| Figure 13 | The protein purification. | 78 |
| Figure 14 | Western blot analysis. | 79 |
| Figure 15 | In vitro laccase activity of MgLac1. | 81 |
| Figure 16 | In vitro laccase activity of MgLac2. | 82 |
| Figure 17 | In vitro inhibition studies of MgLac1. | 84 |
| Figure 18 | In vitro inhibition studies of MgLac2. | 85 |
| Figure 19 | Thermostability studies of MgLac1 and MgLac2. | 88 |
| Figure 20 | Optimum pH studies of MgLac1. | 89 |
| Figure 21 | Optimum pH studies of MgLac2. | 90 |
| Figure 22 | Dye decolorising activity. | 91 |
| Figure 23 | DHN polymerisation potential. | 93 |

| Figure 24 | Construction of MgLac1 antisense vector. | 94 |
|-----------|---|-----|
| Figure 25 | Construction of MgLac2antisense vector. | 95 |
| Figure 26 | Agrobacterium tumefaciens mediated transformation of grisea (ATMT) | 97 |
| Figure 27 | Southern blot analysis of <i>MgLac</i> 1 and <i>MgLac</i> 2 knock-down transformants. | 98 |
| Figure 28 | Relative expression of Mglac1 and MgLac2 gene in transformants. | 101 |
| Figure 29 | Representative appressorium formation and infection assay of <i>MgLac</i> 1 knock-down transformants. | 102 |
| Figure 30 | Effect of metals on growth of <i>MgLac</i> 1 knock-down transformants. | 103 |
| Figure 31 | Elemental analysis of <i>MoLac</i> 1 knock-down transformants. | 104 |
| Figure 32 | Profile of laccase activity in wild type B157 and <i>MgLac</i> 1 knock- down transformants. | 105 |
| Figure 33 | RepresentativemorphologyofMgLac2knock-downtransformants. | 107 |
| Figure 34 | Treatment of <i>MgLac</i> 2 knock-down transformants with cell-wall-degrading enzymes. | 108 |
| Figure 35 | Representative infection and penetration assay of <i>MoLac2</i> knock- down transformants. | 109 |
| Figure 36 | Effect of metals and chemicals on growth of <i>MgLac</i> 2 knock-down transformants. | 114 |
| Figure 37 | Elemental analysis of MgLac2 knock-down transformants. | 115 |
| Figure 38 | Cellular distribution of lipids in wild type strain B157 and <i>MgLac2</i> knock-down transformants. | 116 |
| Figure 39 | Profile of laccase activity in B157 and MgLac2 knock-down transformants. | 117 |
| Figure 40 | Relative expression of other multicopper oxidases in the <i>MgLac1</i> knock-down transformants. | 118 |
| Figure 41 | Relative expression of other multicopper oxidases in the <i>MgLac2</i> knock-down transformants. | 119 |
| Figure 42 | Preparation of dsRNA and siRNA of 5 multicopper oxidases. | 120 |

| Figure 43 | Reduction in the GFP fluorescence | 121 |
|-----------|---|-----|
| Figure 44 | siRNA based protoplast transformation of <i>M. grisea</i> . | 122 |
| Figure 45 | Transmembrane localisation prediction of MGG_07771. | 123 |