

LIST OF FIGURES

| | |
|---|----|
| Figure 1 Distribution of caspases, paracaspases and metacaspases in different kingdoms and their evolutionary relationship..... | 22 |
| Figure 2 Map of Gateway entry vector pDONR207..... | 43 |
| Figure 3 Map of Gateway destination vector pMDC32..... | 44 |
| Figure 4 Map of Gateway destination vector pMDC163..... | 45 |
| Figure 5 Map of plasmid pRS300..... | 46 |
| Figure 6 Cloning strategy of amiRNA..... | 46 |
| Figure 7 Phylogenetic tree showing relationship between different metacaspases from <i>S. lycopersicum</i> and <i>A. thaliana</i> | 48 |
| Figure 8 Conserved domains in tomato metacaspases..... | 49 |
| Figure 9 Multiple sequence alignment using amino acid sequences of metacaspase from <i>S. lycopersicum</i> and <i>A. thaliana</i> | 50 |
| Figure 10 Promoter cis regulatory element analysis of tomato metacaspase..... | 52 |
| Figure 11 Chromosomal distribution of tomato metacaspases..... | 53 |
| Figure 12 Gene structure of tomato metacaspases..... | 53 |
| Figure 13 qRT-PCR analysis of SolycMC1 expression levels in various vegetative and reproductive tissues of tomato..... | 56 |
| Figure 14 qRT-PCR analysis of SolycMC1-L1 expression in vegetative and reproductive tissues of tomato..... | 56 |
| Figure 15 qRT-PCR analysis of SolycMC1-L2 expression in vegetative and reproductive tissues of tomato..... | 57 |
| Figure 16 qT-PCR analysis of SolycMC3 expression in vegetative and reproductive tissues of tomato..... | 58 |
| Figure 17 qRT-PCR analysis of SolycMC3-L1 expression levels in vegetative and reproductive tissues of tomato..... | 59 |
| Figure 18 qRT-PCR analysis of SolycMC3-L2 expression in different vegetative and reproductive tissues of tomato..... | 59 |
| Figure 19 qRT-PCR analysis of SolycMC4 expression levels in different vegetative and reproductive tissues of tomato. Values..... | 60 |
| Figure 20 qRT-PCR analysis showing expression of SolycMC9 in different vegetative and reproductive tissues of tomato..... | 61 |
| Figure 21 Expression analysis of SolycMC4 using PromSolycMC4::GUS line..... | 62 |
| Figure 22 Target site of amiRNA used for silencing of SolycMC4 gene..... | 63 |

| | |
|--|----|
| Figure 23 Growth of 35S::amiRNA-SolycMC4 silencing line T1 and control plantlets cultured invitro..... | 65 |
| Figure 24 Growth of 35S::amiRNA-SolycMC4 silencing line T1 and control plants in potted soil..... | 65 |
| Figure 25 Stem anatomical of amiRNA-SolycMC4..... | 66 |
| Figure 26 Phenotypic characterization of in vitro grown plantlets of amiRNA-SolycMC4 silencing lines and its comparison with control..... | 68 |
| Figure 27 chlorophyll content and anthocyanin content estimated in the leaves of amiRNA-SolycMC4 expressing lines and control..... | 70 |
| Figure 28 Detection of H ₂ O ₂ production by DAB histochemical analysis in the leaf and root of amiRNA-SolycMC4 line and control..... | 71 |
| Figure 29 Activity of Antioxidant enzymes, Catalase, guaiacol peroxidase, superoxide dismutase and ascorbate peroxidase in the leaves of amiRNA-SolycMC4 lines and control plants..... | 73 |
| Figure 30 Expression analysis of ROS scavenging genes, APX1, Catalase, Cu/Zn SOD and PXD27 in amiRNA-SolycMC4 lines and control plants..... | 74 |
| Figure 31 senescence, chloroplast and mitochondria related marker genes expression analysis of amiRNA-SolycMC4 line and control..... | 77 |
| Figure 32 Expression analysis of various autophagy and cell death marker genes in plants of amiRNA-SolycMC4 line and control..... | 79 |
| Figure 33 Subcellular localization of SolycMC4::GFP fusion protein in the protoplast of tomato..... | 81 |
| Figure 34 Summary of Effects of SolycMC4 silencing in Tomato plant..... | 89 |
| Figure 35 Possible roles of SolycMC4 in plant development..... | 89 |