CLONING, EXPRESSION ANALYSIS AND STRUCTURAL CHARACTERIZATION OF PR1 FROM KAYMA- A RESISTANT RICE CULTIVAR IN KERALA AGAINST RHIZOCTONIA SOLANI

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Abstract- Sheath blight (SB) is a devastating rice disease caused by Rhizoctonia solani (R.solani) affects drastic reduction in rice production worldwide. Plants possess different defense mechanisms to circumvent infections; one among them is induction of Pathogenesis Related proteins (PRs). PRs are a class of defense proteins with a cardinal role in ensuing disease resistance in host plants by specific pathological stress in which PR1 classes are commonly used as a dominant marker for systemic acquired resistance. Nine traditional rice cultivars were tested to find out the resistance against R.solani wherein Kayma expressed good resistance. Total RNA from the leaves of Kayma was isolated and performed one step RT-PCR using PR1 primers (FP 5'-GCATCGAAAATGGCAACCTCC-3' and RP 5'-CGGCTGACGGCTTTATTCCC-3'), designed from existing database of O.sativa PR1 gene. The amplified cDNA was sequenced and deposited in Genebank of NCBI (ID: KP257093.1). Quantitative real-time PCR (qRT-PCR) analyses of PR1 gene were carried during 0hr (control), 24, 48 and 72 hours post inoculation (hpi). The result showed that PR1 was markedly up-regulated at 48hpi. The ORF finder revealed 149 amino acid residues for the 717 bp nucleotide sequence. Homology model of PR1 protein was developed using MODELLER program from Discovery studio 4.0. The qualitative analysis of the modeled PR protein was carried out using standard validation tools and the modeled structure was deposited in PMDB (ID: PM0080068). The cloned PR1 sequence of Kayma can be used for developing transgenic plants with the resistant gene and the structure developed through homology modeling can be used for crystallization studies.

Keywords- Rice, Rhizoctonia solani, PR1 protein, homology modeling.