Analysis of Allelic Diversity of Drought Responsive ERF Genes in Sri Lankan Rice Germplasm

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Ethylene response factor (ERF), is a prominent transcription factor gene family that governs numerous abiotic stress-related physiological activities in plants. Drought is the foremost yield-limiting factor of the second-largest staple crop of the globe. Bioinformatics tools provide a robust platform to investigate the genetic characteristics towards rice plant drought responses. The present study aimed to analyze the allelic variations of *OsEBP89*, *OsERF101*, *OsERF71*, *OsERF48*, *OsERF12* and *OsLG3*; drought-responsive ERF genes *in silico* within the Sri Lankan rice pool. Genes were selected from the Rice Annotation Project (RAP) database concerning *Oryza sativa* sp. japonica cv. 'Nipponbare' as the reference genome. Selected gene sequences of 47 Sri Lankan rice varieties were retrieved from the Rice SNP-Seek database and allelic variation was assessed concerning the corresponding gene sequences of Nipponbare using MEGA 7- Clustal W method. Present Results revealed several InDels and SNPs: 6 SNPs in *OsEBP89* (A/G at 15nt, G/T at 380nt, C/T at 381nt, T/A at 555nt, C/T at 709nt and G/T at 951nt), 1 InDel and 3 SNPs in *OsERF101* (C/A at 87nt, A/G at 687nt and C/T at 725nt), 8 SNPs in *OsERF71* (C/A at 118nt, G/A at 360nt, C/T at 623nt, G/A at 742nt, G/T at 849nt, C/T at 867nt, T/C at 939nt and G/A at 981nt), 1 InDel and 5 SNPs in *OsERF48* (C/G at 655nt, G/Tat 768nt, C/G at 812nt, C/T at 1112nt and G/C at 1162nt), 1 InDel and 5 SNPs in *OsERF12* (G/T at 41nt, C/T at 150nt, G/A at 336nt, C/G at 365nt and C/T at 957nt) and 3 SNPs in *OsLG3* (C/T at 293nt, C/T at 487nt and A/G at 810nt).The MEGA 7 assisted phylogenetic analysis unveil apparent allelic variation within the Sri Lankan rice germplasm. The encoded proteins of *OsERF101*, *OsERF48* and *OsERF12* genes were subjected to secondary structure prediction and physicochemical analysis. The Physicochemical properties varied among structures of corresponding proteins. However, major differences in folding patterns were not observed. Functional characterization and phenotypic validations are essential to investigate the potential of these genes in drought-tolerant rice improvement programs.

Keywords: Allelic variation; Drought stress; Ethylene Response Factor; Rice