ABSTRACT

Eggplant (*Solanum melongena*) and watermelon (*Citrullus lanatus*) are susceptible to numerous diseases caused by bacteria, fungi, virus, and nematode. Bacterial wilt (causal organism-*Ralstonia solanacearum*) and fusarium wilt (causal organism-*Fusarium oxysporum* f. sp. *niveum* (FON)) are the most important soil-borne diseases of eggplant and watermelon worldwide, respectively. The best way to control economically is to develop cultivars resistant to these soil-borne pathogens. Non-availability of disease resistant varieties in both eggplant and watermelon is a matter of concern. Resistance gene (R-gene) cloning and sequencing to obtain resistance gene analogs (RGAs) is one of the most recent and successful approach for obtaining disease resistant cultivars. Degenerative PCR based primers were used for isolating R-genes/RGAs from bacterial wilt and fusarium wilt resistant cultivated/wild species of eggplant and watermelon, respectively through amplification of the target region of nucleotide binding site-leucine rich repeat (NBS-LRR).

Genetic diversity was observed in the sequences isolated, and sequences showing specific full-length conserved motifs with uninterrupted ORFs were shortlisted as eggplant and watermelon RGAs. Multiple sequence alignment of these RGAs identified the characteristic NBS-LRR motifs, and BLASTp results revealed similarity of these RGAs with other plant-pathogenesis-related proteins. Phylogeny and motif analysis revealed genetic diversity within eggplant/watermelon RGAs, and with other plant R-genes.

Eggplant and watermelon RGAs isolated in this study belong to both toll interleukin-1 receptors (TIR)-NBS-LRR (TNL) and non-TIR-NBS-LRR (CNL) class of R-genes and showed similarity with other plant resistance genes. This study also confirmed the hypothesis that dicots have both TIR and non-TIR resistance genes. Protein secondary-structure prediction of isolated RGAs revealed the composition of α-helix, β-strand, disordered region and other template-related information.

Watermelon RGAs identified in the present study will help in the development of RGA based linked markers for resistance to watermelon diseases. The present study on eggplant and watermelon RGAs will help in development of RGA based linked markers for resistance to eggplant, watermelon and other plant diseases. Further, it will provide information and pave the way for elucidation at the molecular level of wild and cultivated species' mechanism of resistance to bacterial wilt and fusarium wilt.