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Altered Gene Expression: Induction/Suppression of some Pathogenesis Related Protein Genes in an Egyptian Isolate of Potato Leafroll Virus (PLRV)

Authors : Dalia G. Aseel

Abstract : The potato (Solanum tubersum, L.) has become one of the major vegetable crops in Egypt and all over the world. Potato leafroll virus(PLRV) was observed on potato plants collected from different governorates in Egypt. Three cultivars, Spunta, Diamont, and Cara, infected with PLRV were collected; RNA was extracted and subjected to Real-Time PCR using the coat protein gene primers. The results showed that the expression of the coat protein was 39.6-fold, 12.45-fold, and 47.43-fold, respectively, for Spunta, Diamont, and Cara cultivars. Differential Display Polymerase Chain Reaction (DD-PCR) using pathogenesis-related protein 1 (PR-1), β-1,3-glucanases (PR-2), chitinase (PR-3), peroxidase (POD), and polyphenol oxidase (PPO) forward primers for pathogenesis-related proteins (PR). The obtained data revealed different banding patterns depending on the viral type and the region of infection. Regarding PLRV, 58 up-regulated and 19 down-regulated genes were detected. Sequence analysis of the up-and down-regulated genes revealed that infected plants were observed in comparison with the healthy control. Sequence analysis of the up-regulated gene was performed, and the encoding sequence analysis showed that the obtained genes include: induced stolen tip protein. On the other hand, two down-regulated genes were identified: disease resistance RPP-like protein and non-specific lipid-transfer protein. In this study, the expressions of PR-1, PR-2, PR-3, POD, and PPO genes in the infected leaves of three potato cultivars were estimated by quantitative real-time PCR. We can conclude that the PLRV-infection of potato plants inhibited the expression of the five PR genes. On the contrary, infected leaves by PLRV elevated the expression of some defense genes. This interaction may also induce and/or suppress the expression of some genes responsible for the plant's defense mechanisms.

Keywords : PLRV, pathogenesis-related proteins (PRs), DD-PCR, sequence, real-time PCR
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