Abstract

Plants evoke a variety of defense responses against invading pathogens. The aim of this work was achieving novel information about tomato-*Fusarium oxysporum* f. sp. *lycopersici* interactions in respect to induced defense and oxidative burst. High amount of ferulic acid in combination with other phenolics, *viz*. 4-hydroxybenzoic acid, vanillic acid, 4-hydroxybenzaldehyde, vanillin and 4-coumaric acid, and higher levels of phenylalanine ammonia lyase (PAL) and peroxidase (POD) activities were detected in roots of tomato after 60 days of growth. Changes in phenolic metabolism and lignin deposition were studied in roots of tomato plants after elicitation with four elicitors, i.e. *Fusarium* mycelium extract, chitosan, *Fusarium* culture filtrate and *Trichoderma* mycelium extract. Cell wall strengthening, through the deposition of lignin, preceded by the induction of the synthesizing enzymes appeared to play important roles in the defense response of tomato plants in reaction to elicitors, including the pathogen-derived *Fusarium* mycelium extract. The oxidative burst generated in the interaction between tomato and *Fusarium oxysporum* f. sp. *lycopersici* might be an early first line of defense by the host mounted against the necrotrophic pathogen. However, seemingly less efficient antioxidative system resulting in accumulation of reactive oxygen species and the observed higher rate of lipid peroxidation indicated that the biochemical events were largely in favour of the pathogen. It appeared that the oxidative burst served as a weapon for the necrotrophic pathogen because the antioxidative system was not strong enough to impede the pathogen ingress in the host. Root feeding and foliar spray of salicylic acid at a concentration of 200 μM were found to reduce susceptibility of tomato plants to *Fusarium oxysporum* f. sp. *lycopersici*, likely due to induction of systemic acquired resistance accompanied by increased activities of the defense enzymes PAL and POD. Pattern of occurrence of cell wall-bound phenolics in hairy roots of tomato resembled with that of the normal roots. Tomato hairy root cultures evoked defense responses similar to normal root organs in reaction to the above four elicitors, including *Fusarium* mycelium extract. The results suggested that the hairy roots could be used as a system to study plant-pathogen interactions in roots.

Keywords: *Fusarium* mycelium extract, *Fusarium oxysporum* f. sp. *lycopersici*, Hairy roots, Lignin, Oxidative burst, Salicylic acid, *Solanum lycopersicum*