

Abstract

Changes in the activities of the antioxidant enzymes, superoxide dismutase (SOD; EC 1.15.1.1), catalase (CAT; EC 1.11.1.6), ascorbate peroxidase (APX; EC 1.11.1.11) and glutathione reductase (GR; EC 1.6.4.2), as well as in soluble and insoluble peroxidase (POD; EC 1.11.1.7) and in phenylalanine ammonia-lyase (PAL; EC 4.3.1.5) activity and *Pal* transcript levels in flavedo and albedo tissues of citrus fruit infected with *Penicillium digitatum* have been examined. Specific probes corresponding to a fragment of the large subunit of the nuclear rRNA from both organisms have been cloned and used to determine the advance of the fungus through the fruit. The activities of all the enzymes were higher in non-infected areas of the flavedo than in the albedo, a fact that may be related to the higher resistance of the flavedo to infection by the pathogen. In both tissues, the activity of the antioxidant enzymes decreased at different rates with the advance of the fungus, except for CAT and soluble POD activities that increased in the area of the flavedo completely colonized by the fungus. On the other hand, the flavedo, but not the albedo, was able to respond to pathogen attack by increasing insoluble POD and PAL activities and *Pal* transcript levels. However, discrepancies between PAL activity and mRNA levels suggest the ability of *P. digitatum* to suppress this defense response. Thus, the present study shows that in the interaction between citrus–*P. digitatum* both host defense responses and pathogen virulence mechanisms are taking place.