

Title *Penicillium digitatum* suppresses production of hydrogen peroxide in host tissue during infection of citrus fruit

Authors D. Macarisin, L. Cohen, A. Eick, G. Rafael, E. Belausov, M. Wisniewski and S. Droby

Citation Phytopathology 97 (11): 1491-1500. 2007.

Keywords citrus; hydrogen peroxide

Abstract

During the infection of citrus fruit by *Penicillium digitatum* there is little evidence of a host defense response. This suggests that *P. digitatum* has the ability to suppress host defenses. The current study demonstrates that *P. digitatum* suppresses a defense-related hydrogen peroxide (H₂O₂) burst in host tissue. In contrast, the nonhost pathogen, *Penicillium expansum*, triggers production of a significant amount of H₂O₂ in citrus fruit exocarp. Using laser scanning confocal microscopy, we demonstrated that *P. digitatum* suppressed an elevation in H₂O₂ up to 42 h after inoculation. Nevertheless, H₂O₂ levels around wounds inoculated with *P. expansum* increased by 63-fold above the control. *P. digitatum* continued to suppress H₂O₂ production in citrus fruit exocarp up to 66 h postinoculation and H₂O₂ levels were actually threefold below that of noninoculated controls. In contrast, the H₂O₂ level was still about 11-fold above the control value in wound sites inoculated with *P. expansum*. Studies on the effect of organic acids (as pH modulators) on the response of citrus fruit to compatible and noncompatible pathogens indicated that pathogenicity was enhanced only when host-tissue acidification was accompanied by the suppression of H₂O₂. Additionally, pathogenicity of both *P. digitatum* and *P. expansum* on citrus fruit was significantly enhanced by the H₂O₂-scavenging enzyme catalase. Based on our study and previous reports regarding the potential involvement of citric acid and catalase in green mold pathogenesis, we suggest that these compounds are strongly associated with the virulence of *P. digitatum*.