Preharvest application of salicylic acid induces some resistant genes of sweet pepper against black mold disease

Fayz A. Abdel-Rahman, Eman Y. Khafagi, Maali S. Soliman, Tahsin Shoala and Yosra Ahmed

European Journal of Plant Pathology 159: 755–768. 2021.

Abstract

Pepper fruits are subjected to various postharvest diseases such as black mold caused by *Alternaria alternata*. The efficacy of exogenous applications of salicylic acid (SA) in bulk and nanoscale forms to control the black mold was studied. In vitro studies revealed that both SA bulk materials and SA nanoparticles (SANPs) at 1.4 mM significantly suppressed the growth of *A. alternata,* yet SANPs showed a higher suppressive effect compared to SA bulk equivalent. Examinations using scanning electron microscopy (SEM) and transmission electron microscopy (TEM) showed hyphal and conidial deformations in addition to changes in cellular structure of *A. alternata* when treated with both forms of SA at 1.4 mM concentration. The preharvest spraying of SANPs at 1.4 mM displayed the highest significant suppression of disease severity under artificial inoculation and natural infection of pepper fruits. The efficiency of SA bulk materials and SANPs as elicitors to stimulate the innate immune responses in pepper plants were also investigated. The basic PR-1 gene (*CaBPR1*), beta-1, 3-glucanase (*CaBGLU*) and peroxidase (*CaPO1)* defense-related genes showed upregulation expression in leaves of pepper plants treated by both forms of SA. The expression of the three studied genes was affected by SA concentrations. Levels of expression of PR-1, β-1, 3-glucanase and peroxidase genes were the highest (8.8, 8.1 and 7.2 fold change, respectively) in pepper tissues treated with SANPs at 1.4 mM. This study contributes to our understanding of the potential use of SA nanoparticles as a safe strategy to inhibit the fungal infection.