

Salicylic acid and *Cinnamomum verum* confer resistance against *Penicillium* rot by modulating the expression of defense linked genes in *Citrus reticulata* Blanco

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Abstract

Penicillium digitatum and *Penicillium italicum* are potentially important post-harvest pathogens of citrus fruit causing huge economic loss. In this study salicylic acid (SA) and *Cinnamomum verum* were tested to control the infection of *P. digitatum* (green mold) and *P. italicum* (blue mold) as an alternative to chemical control. In an *in vitro* assay methanolic extracts of five plants were tested for antifungal activity where *C. verum* exhibited the highest colony growth inhibition 74.6 and 76.4 % of green and blue mold respectively. Moreover, during *In Planta* assay the combination of *C. verum* and SA produced the lowest disease incidence (20 and 33.3%) and severity (13.1 and 6.1%) of green and blue mold respectively compared to stand-alone treatments without affecting the fruit quality considerably. Furthermore, an upsurge in the activity of polyphenol oxidase (*PPO*), peroxidase (*POD*), and phenylalanine ammonia lyase (*PAL*) encoding genes of citrus fruit was recorded during transcriptional profiling. The highest gene expression was recorded in fruit treated with *C. verum* and SA in combination compared to healthy control. Similar results were observed during quantification of corresponding gene products. This unveils the fact that the enhanced expression of defense-linked genes might be associated with the disease suppression. Conclusively, our findings indicate that *C. verum* and SA in combination can suppress green and blue mold of Citrus by modulating the expression of defense-linked genes. The combined use of plant extracts and resistance inducers is a safer alternate to chemicals to suppress green and blue mold during storage.