

Synergistic activity of cinnamaldehyde and citronellal against green mold in citrus fruit

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Abstract

The citrus postharvest pathogen *Penicillium digitatum* is responsible for the green mold decay in citrus fruit, causing tremendous economic losses. In this study, we observed that the combination of cinnamaldehyde and citronellal (CO, 5: 16, v/v) exhibited synergistic action compared to the individual compounds on the mycelial growth of *P. digitatum*, with the minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) both being 0.40 mL L⁻¹. And this synergistic action also verified by the spores' germination results of cinnamaldehyde, citronellal and CO against *P. digitatum*. Significantly, the postharvest wax + CO (WCO, 1 × MFC) treatment on Satsuma mandarin citrus fruit incubated with *P. digitatum* could effectively reduce the decay of green mold. After 5 d of storage, the rotting rate of WCO treatment was only 38 %, which was clearly lower than the control fruit (100 %). Simultaneously, WCO treatment maintained the quality of citrus fruit. Additionally, the effects of cinnamaldehyde, citronellal and CO on the cell wall and cell membrane integrity of *P. digitatum* showed that the combined use of citronellal or cinnamaldehyde accelerated the damage of cell wall and cell membrane. Therefore, the combination of cinnamaldehyde and citronellal (5: 16, v/v) is a promising natural preservative in controlling green mold and prolonging the shelf life of citrus fruit.