Title Effect of ozone application during cold storage of kiwifruit on the development of stem-end rot caused by *Botrytis cinerea*

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Abstract

The effect of gaseous ozone exposure on the development of stem-end rot disease, caused by *Botrytis cinerea*, on kiwifruit (*Actinidia deliciosa*, cv. Hayward) was investigated. Artificially inoculated kiwifruit were subjected for 4 months to conventional cold storage (0 °C, RH 95%) where catalytic oxidation of ethylene was applied (control) and to conventional cold storage with continuous supply of ozone (0.3 μL L^{-1}) or in a conventional kiwifruit cold storage room, where catalytic oxidation of ethylene was applied. Ozone treatment delayed and simultaneously decreased disease incidence by 56%, while disease severity on infected fruit remained unaffected. Infected fruit formed sclerotia, while no sporulation of the pathogen occurred in the presence of ozone. To elucidate whether the observed disease suppression was mediated by a direct effect of ozone on the fungal pathogen *per se* or by the induction of a resistance mechanism in the fruit, two additional sets of experiments were conducted. Kiwifruit were exposed to ozone (0.3 μL L^{-1}) for 0, 2, 8, 24, 72 and 144 h in a conventional cold storage room either before or after the artificial inoculation with the pathogen and its efficacy on disease incidence and severity was monitored. Pre-inoculation exposure of fruit to ozone, at increasing exposure time intervals led to significant suppression of disease incidence, while post-inoculation exposure did not affect it. The observed disease suppression, provided by the pre-inoculation exposure, strongly suggests that ozone treatments induce resistance of kiwifruit to the pathogen. Measurements of antioxidant substances and antioxidant activity on fruit exposed to ozone for the same time intervals showed a strong negative correlation between disease incidence or severity and phenol content.