

Title Toxicity of ozone gas to conidia of *Penicillium digitatum*, *Penicillium italicum*, and *Botrytis cinerea* and control of gray mold on table grapes

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Abstract

Penicillium digitatum, *Penicillium italicum*, and *Botrytis cinerea* attack fresh fruit and cause significant postharvest decay losses. The toxicity of ozone (O₃) gas at different relative humidities to control their conidia was determined. Conidia distributed on cover glasses were exposed to an atmosphere containing 200–350 $\mu\text{L L}^{-1}$ of O₃ gas at 35%, 75%, and 95% relative humidity (RH) at 25 °C. O₃ gas was produced by UV light generators and passed through three 500 mL solutions of saturated MgCl₂ (35% RH), NaCl (75% RH), or K₂SO₄ (95% RH). O₃ and RH inside the chamber were monitored. O₃ exposures were quantified as concentration \times time products adjusted to 1 h ($\mu\text{L L}^{-1} \times \text{h}$). After exposure to O₃ for varying periods, the conidia were removed from the chamber, placed on potato dextrose agar and their germination observed. Conidia died more rapidly at higher humidity than at lower humidity, and *P. digitatum* and *P. italicum* were more resistant to O₃ than *B. cinerea*. At 95% RH, 99% of the conidia of *P. digitatum*, *P. italicum*, and *B. cinerea* were incapable of germination after O₃ exposures of 817, 732, and 702 $\mu\text{L L}^{-1} \times \text{h}$, respectively. At 75% RH, similar inhibition required exposures of 1781, 1274, and 1262 $\mu\text{L L}^{-1} \times \text{h}$, respectively. At 35% RH, O₃ toxicity declined markedly, and 99% mortality required 11,410, 10,775, and 7713 $\mu\text{L L}^{-1} \times \text{h}$, respectively. These values can be used to select O₃ gas exposures needed to control these conidia. Conidia of *B. cinerea* were sprayed on to the surface of table grapes and 2 h later the grapes were exposed to 800–2000 $\mu\text{L L}^{-1} \times \text{h}$ of O₃. O₃ at 800 $\mu\text{L L}^{-1} \times \text{h}$ or more reduced the incidence of infected berries by 85% and 45% on ‘Autumn Seedless’ and ‘Scarlet Royal’ grapes, respectively. Fumigation with O₃ can control postharvest pathogenic fungi on commodities that tolerate this gas, or it can be applied to disinfect processing equipment and storage rooms when the produce is not present.