Title Integration of continuous biofumigation with *Muscodor albus* with pre-cooling fumigation with ozone or sulfur dioxide to control postharvest gray mold of table grapes

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Abstract

An integrated approach was evaluated that combined biological and chemical fumigation of table grapes to control postharvest gray mold caused by *Botrytis cinerea*. After fumigation of the grapes with ozone or sulfur dioxide during pre-cooling, the fruit were then exposed to continuous biofumigation by the volatile-producing fungus *Muscodor albus* during storage. Biofumigation was provided by in-package generators containing a live grain culture of the fungus. This grain formulation of *M. albus* survived the initial ozone or sulfur dioxide fumigation, but sulfur dioxide reduced its production of isobutyric acid, an indicator of the production of antifungal volatiles. Gray mold incidence was reduced among inoculated 'Autumn Seedless' grapes from 91.7 to 19.3% by 1 h fumigation with 5000 $\mu L\ L^{-1}$ ozone, and further reduced to 10.0% when ozone fumigation and *M. albus* biofumigation were combined. The natural incidence of gray mold among organically grown 'Thompson Seedless' grapes after 1 month of storage at 0.5 °C was 31.0%. Ozone fumigation and *M. albus* biofumigation reduced the incidence of gray mold to 9.7 and 4.4, respectively, while the combined treatment reduced gray mold incidence to 3.4%. The use of commercial sulfur dioxide pads reduced the incidence to 1.1%. The combination of ozone and *M. albus* controlled decay significantly, but was less effective than the standard sulfur dioxide treatments. Although less effective than sulfur dioxide treatment, ozone and *M. albus* controlled decay significantly, and could be alternatives to sulfur dioxide, particularly for growers complying with organic production requirements.