

Title Temperature and controlled atmosphere effects on efficacy of *Muscodor albus* as a biofumigant

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Abstract

Biofumigation with *Muscodor albus* was investigated to control four fungal decay pathogens (*Phytophthora erythroseptica*, *Sclerotinia sclerotiorum*, *Botrytis cinerea* and *Penicillium expansum*) and four bacterial pathogens (*Erwinia carotovora* pv. *carotovora*, *Pseudomonas fluorescens*, *Escherichia coli*, *Listeria innocua*) in controlled atmosphere conditions (regular air (20.8% O₂ + 0.03% CO₂), high CO₂ (20.8% O₂ + 15% CO₂) or low O₂ (1% O₂ + 0.03% CO₂)). *In vitro* experiments involved 48 h exposure to *M. albus* at 3 °C or 20 °C, *in vivo* experiments involved 72 h exposure to *M. albus* at 3 °C. *In vitro* biofumigation with *M. albus* in regular air at 20 °C killed all the pathogens. Bacterial growth was best controlled by *M. albus* at 20 °C regardless of atmospheric conditions whereas fungal growth was controlled regardless of both temperature and atmosphere. The growth of the pathogens was not affected by lowering the temperature to 3 °C whereas the growth of *M. albus* was minimized below 5 °C. The fungal decay pathogens were still controlled well at 3 °C, but the bacteria were not. The effectiveness of *M. albus* to control *in vivo* apple decay caused by *S. sclerotiorum*, *B. cinerea* or *P. expansum* was variable and poor, probably due to the short biofumigation period (72 h) employed. The positive results obtained for *S. sclerotiorum* in all conditions and for *B. cinerea* in regular air *in vivo* at 3 °C on apple fruit, indicate that *M. albus* could be a very useful tool for post harvest treatment in cool storage.