

Title Interactive effects of ozone and 1-methylcyclopropene on decay resistance and quality of stored carrots

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Abstract

Fresh carrots were treated with or without $1.0 \mu\text{L L}^{-1}$ 1-methylcyclopropene (1-MCP) at 10°C for 16 h, and then exposed to 300 or 1000 nL L^{-1} ozone at 10°C for 0, 1, 2, or 4 days. The carrots were stored at 0°C for up to 24 weeks and evaluated every 4 weeks for resistance to challenge inoculations of *Botrytis cinerea* and *Sclerotinia sclerotiorum*. Quality attributes and stress and flavor volatiles were also quantified. Decay resistance to *B. cinerea* was induced by treatments with 1000 nL L^{-1} ozone for 2 or 4 days, however no lasting resistance to *S. sclerotiorum* was induced. Firmness was reduced in carrots treated with either 300 or 1000 nL L^{-1} ozone for 4 days. Treatment with ozone for 1, 2, or 4 days resulted in 60–90% greater respiration rates than controls, but this effect diminished within 4 weeks of storage. Ozone treatments stimulated the production of the stress volatiles ethanol and hexanal, which were, respectively, 43- and 11-times greater than the controls immediately after a 4-day exposure to 1000 nL L^{-1} , but this effect diminished with storage time. Sucrose concentrations were reduced, but terpene concentrations were increased. Treatment with 1-MCP reduced *B. cinerea* resistance induced by the ozone treatments. Respiration rates, loss of sucrose, and increase in glucose and fructose during storage were also reduced by 1-MCP treatment. Treatment with 1-MCP had no effect on weight loss or firmness. In general, the concentrations of pre-storage ozone that induced resistance to *B. cinerea* also reduced carrot quality and therefore are not likely of commercial value.