Title Low-level atmospheric ozone exposure induces protection against *Botrytis cinerea* with down-regulation of ethylene-, jasmonate- and pathogenesis-related genes in tomatofruit

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Abstract

The aim of this study was to determine if ozone exposure could prevent spoilage in tomatofruit by fungal infection and to explore concomitant changes in expression of genes involved in signal transduction (ethylene, jasmonic acid and C_6-aldehydes) and defence-related (chitinases, glucanases and defensin) pathways. Tomatofruit (*Lycopersicon esculentum* Mill. cv. Mareta) were exposed to low-level ozone enrichment (0.05 μmol mol^{-1}) for up to 6 days and then wounded and/or inoculated with *Botrytis cinerea* (grey mould) and transferred for one or two weeks' post-fumigation exposure to 'clean' (i.e. Charcoal/Purafil®-filtered) air in chilled storage (13 °C). Control fruit were maintained throughout in 'clean' air. Pre-exposure to ozone resulted in a marked reduction in lesion development when fruit were subsequently wounded and inoculated with a mycelial plug. Tomatofruit subjected to ozone-enrichment not only showed enhanced protection against fungal infection, but also retained firmness in comparison with fruit maintained in 'clean' air. Ozone treatment resulted in strong inhibition of expression of both signal transduction (1-aminocyclopropane-1-carboxylic acid oxidase, allene oxide synthase and hydroperoxide lyase), and defence-related (acidic chitinase, basic chitinase, acidic glucanase, basic glucanase, plantdefensin) genes, and the pattern of change was consistent with suppression of fungal growth. Overall, ozone exposure would appear to enhance tomato resistance to *B. cinerea*infection and has potential commercial applications.