Title Effects of pathogen polygalacturonase, ethylene, and firmness on interactions between pear fruits and *Botrytis cinerea*

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Abstract

The plant hormone ethylene regulates developmental processes as well as responses to abiotic stress and pathogens. Ethylene influences interactions between the gray mold pathogen, *Botrytis cinerea*, and its hosts. The primary objective of this study was to determine the effect of ethylene on gray mold susceptibility of pear fruits. *B. cinerea* induced ethylene emission from infected pear fruits. As expected, ethylene production and softening of pear fruits were accelerated by propylene and inhibited by 1-methylcyclopropene (1-MCP), but these chemical treatments had a relatively small effect on the rate of lesion expansion after wound inoculation with *B. cinerea*. Cotreatment of pear fruits with 1-MCP and aminoethoxyvinylglycine (AVG) delayed the onset of ethylene emission well beyond the onset of lesion expansion. The trace amount of ethylene produced after inhibition with AVG and 1-MCP was at least partially produced via 1-aminocyclopropane-1-carboxylic acid. Gray mold susceptibility was cultivar-dependent; d'Anjou pears were more susceptible than Bartlett fruits. Storage enhanced the susceptibility of pear fruits. Virulence of the *B. cinerea* strain B05.10 on pear fruits was dependent on the polygalacturonase gene *Bcpg1*, but not on the pectin methylesterase gene *Bcpme1*. Thus, we conclude that, unlike exogenous manipulation of ethylene and associated changes in fruit softening, pectin catabolism plays a major role in gray mold susceptibility of pear.