

Title NAA and Ethylene Regulate Expression of Genes Related to Ethylene Biosynthesis, Perception, and Cell Wall Degradation During Fruit Abscission and Ripening in ‘Delicious’ Apples

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Abstract

Expression of genes for ethylene biosynthesis, ethylene perception, and cell wall degradation in the fruit cortex and abscission zone was examined during fruit abscission and ripening in ‘Delicious’ apples (*Malus × domestica*). An autocatalytic burst of fruit ethylene production and accelerated fruit softening were associated with increased expression of genes related to ethylene biosynthesis (*MdACS* and *MdACO*), whereas reduced expression of ethylene receptor genes (*MdETR* and *MdERS*), increased expression of an ethylene signal transduction gene (*MdCTR1*), and increased expression of genes related to cell wall degradation (*MdPG* and *MdEG*) in the fruit cortex occurred during fruit ripening. Aminoethoxyvinylglycine (AVG) or 1-methylcyclopropene (1-MCP) inhibited fruit ethylene production, suppressed expression of *MdACS1*, *MdACO1*, *MdERS1*, and *MdPG1* in the fruit cortex, and delayed fruit softening, whereas naphthaleneacetic acid (NAA) increased fruit ethylene production, increased expression of *MdACS1*, *MdACO1*, *MdERS1* and *MdPG1* in the fruit cortex, and accelerated fruit softening. Fruit abscission and expression of *MdACS5A*, *MdACS5B*, *MdACO1*, *MdPG2*, and *MdEG1* in the fruit abscission zone were reduced by AVG and 1-MCP. NAA also reduced fruit abscission while reducing expression of *MdPG2* and *MdEG1* only in the fruit abscission zone. The levels of *MdETR1*, *MdETR2*, *MdERS1*, and *MdERS2* transcripts in the fruit abscission zone decreased during fruit abscission and fruit ripening regardless of treatment. The combination of NAA and AVG was more effective in inhibiting expression of *MdPG2* and *MdEG1* in the fruit abscission zone and reducing fruit abscission than was either NAA or AVG used alone.

<http://www.springerlink.com/content/b258173146737v10/fulltext.pdf>