

Ethylene promotes IAA reduction through PuERFs-activated *PuGH3.1* during fruit ripening in pear (*Pyrus ussuriensis*)

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Abstract

The phytohormone IAA is crucial for plant growth, but IAA often exists as inactive conjugated forms in which IAA-amino acid conjugates are one of the major components. GH3 (Gretchen hagen 3) genes can conjugate free IAA to IAA-amide and some of them are stimulated by ethylene in climacteric fruit, but the molecular mechanism of how *GH3* genes are regulated by ethylene during fruit ripening is not clear. Here, we used ethephon (an ethylene releaser) and 1-MCP (an ethylene inhibitor) to treat pear fruit, and the results showed free IAA content was essentially repressed by ethephon, whereas 1-MCP elevated it. Gene expression analysis showed that *PuTAR2* (tryptophan aminotransferase of *Arabidopsis*/tryptophan aminotransferase related), which controls the first step of IAA biosynthesis, was up-regulated by ethephon treatment and presented in contrast to IAA content, indicating that the decline in the IAA concentration was not due to the suppressed biosynthesis of IAA by ethylene. Meanwhile, *PuGH3.1* which plays important role in free IAA decline shared high correlation with ethylene production and IAA content. Furthermore, we found a DRE-motif in the *PuGH3.1* promoter, and *PuERF2*, which was selected as an example from four ERFs, could bind to this promoter and activate its expression. These results demonstrated that ethylene promoted IAA decline through PuERFs activating *PuGH3.1*. Our findings provided new insight into the interactions between auxin and ethylene.