

Title Reciprocity between abscisic acid and ethylene at the onset of berry ripening and after harvest

Author Liang Sun, Mei Zhang, Jie Ren, Jianxun Qi, Guojun Zhang and Ping Leng

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Keywords

Abstract

Background

The ripening of grape berry is generally regulated by abscisic acid (ABA), and has no relationship with ethylene function. However, functional interaction and synergism between ABA and ethylene during the beginning of grape berry ripening (véraison) has been found recently.

Results

The expressions of *VvNCED1* encoding 9-*cis*-epoxycarotenoid dioxygenase (NCED) and *VvGT* encoding ABA glucosyltransferase were all increased rapidly at the stage of véraison and reached the highest level at 9th week after full bloom. However, *VvCYP1* encoding ABA 8'-hydroxylase and *VvβGI* encoding berry β-glucosidase are different, whose expression peak appeared at the 10th week after full bloom and in especial *VvβGI* remained at a high level till harvest. The *VvACO1* encoding 1-aminocyclopropane-1-carboxylic acid (ACC) oxidase, the *VvETR2* (ethylene response 2) and *VvCTR1* (constitutive triple response 1) had a transient expression peak at pre-véraison, while the *VvEIN4* (ethylene insensitive 4) expression gradually increased from the véraison to one week before harvest stage. The above mentioned changes happened again in the berry after harvest. At one week before véraison, double block treatment with NiCl₂ plus 1-methylcyclopropene (1-MCP) not only inhibited the release of ethylene and the expression of related genes but also suppressed the transcription of *VvNCED1* and the synthesis of ABA which all might result in inhibiting the fruit ripening onset. Treatment with ABA could relieve the double block and restore fruit ripening course. However, after harvest, double block treatment with NiCl₂ plus 1-MCP could not suppress the transcription of *VvNCED1* and the accumulation of ABA, and also could not inhibit the start of fruit senescence.

Conclusion

The trace endogenous ethylene induces the transcription of *VvNCEDI* and then the generation of ABA followed. Both ethylene and ABA are likely to be important and their interplaying may be required to start the process of berry ripening. When the level of ABA reached the peak value, part of it will be stored in the form of ABA-GE. While after harvest, abiotic stresses principally (such as dehydration, harvest shock) could induce the transcription of *VvNCEDI* and the accumulation of ABA, thus starting the process of fruit senescence.

<http://www.springerlink.com/content/v67716x4075m0995/fulltext.pdf>