

Ethylene attenuates chilling injury of banana fruit via the MabHLH060/183 module in controlling phosphatidic acid formation genes

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Abstract

Chilling injury (CI) of banana represents a serious problem constraining postharvest preservation in the industry. Application of ethylene was found to efficiently attenuate CI of banana, however, the mechanism of which remains to be investigated. Here, we found that application of ethrel could ameliorate the CI of banana, as evidenced by lower CI index, electrolytic leakage and malondialdehyde content. Meanwhile, expression of phosphatidic acid (PA) formation genes *MaPLD δ 1*, *MaPLD δ 5* and *MaDGK2*, as well as two transcriptional regulators *MabHLH060* and *MabHLH183* was significantly increased with the progression of CI, but decreased under ethrel treatment. *MabHLH060* and *MabHLH183* were shown to locate in nucleus and have transactivation ability. Importantly, these two transcriptional regulators *MabHLH060/183* recognized the E-box elements in the promoters of *MaPLD δ 1*, *MaPLD δ 5* and *MaDGK2*, and promoted their transcription. Together, these findings suggest that ethylene-alleviated CI of banana may involve the *MabHLH060/183* module in modulating the expression of PA formation genes.