EjCaM7 and EjCAMTA3 synergistically alleviate chilling-induced lignification in loquat fruit by repressing the expression of lignin biosynthesis genes under cold stress

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Abstract

Flesh lignification is a typical chilling injury (CI) symptom of loquat fruit during cold storage. [Calcium](D:/D%E7%9B%98/Youdao/Dict/8.9.9.0/re
ride](D:/D%E7%9B%98/Youdao/Dict/8.9.9.0/resultui/html/index.html) ($CaCl_2$) could enhance chilling tolerance in loquat fruit, but the molecular mechanism is still not illuminated. In this study, $CaCl_2$ treatment suppressed the increase in firmness and lignin content, and retained higher extractable juice, thereby alleviating chilling-induced lignification in loquat fruit. Moreover, $CaCl_2$ enhanced the [calmodulin](javascript:;) (CaM) content, free Ca^{2+} distribution, *EjCaM7*, and CaM binding transcription activators 3 (*EjCAMTA3*) expression in loquat fruit during cold storage, indicating Ca^{2+}/CaM-CAMTA played a key role in response to cold stress. The EjCAMTA3 and EjCaM7 proteins were identified and characterized from loquat fruit. Importantly, EjCAMTA3 bound to the CG-box in *EjPODP7-like* and *EjLAC12-like* promoters to repress their transcription. Further analysis revealed that EjCaM7 interacted with EjCAMTA3 in a Ca^{2+}-dependent manner, and this interaction enhanced the EjCAMTA3-mediated transcriptional repression of *EjPODP7-like* and *EjLAC12-like* genes. Taken together, these findings suggested that $CaCl_2$ treatment alleviates chilling-induced lignification in loquat fruit, which probably via the synergistic role of EjCaM7 and EjCAMTA3 in the modulation of *EjPODP7-like* and *EjLAC12-like* genes expression, leading to the repression of lignin polymerization.

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