CmMYB113 regulates ethylene-dependent sucrose accumulation in postharvest climacteric melon fruit

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Abstract

Sucrose is mainly accumulated in mature oriental melon fruit, and it is generally regulated by ethylene. However, the molecular mechanism of sucrose accumulation induced by ethylene remains largely unknown. Here, high sucrose melon cultivar 'HS' and low sucrose melon cultivar 'LW' fruit were treated with ethylene and 1-MCP at ethylene release initial stage (27 d after anthesis, DAA), we found that the exogenous ethylene treatment promoted the sucrose accumulation, and enhanced the activity of sucrose phosphate synthase (SPS), as well as the transcript of *CmSPS1* in postharvest climacteric melon fruit 'HS'. However, both treatments had no effect on sucrose accumulation, SPS activity and its transcription in 'LW' fruit. In addition, exogenous ethylene increased endogenous ethylene production in 'HS' fruit, and had no effect in 'LW' fruit, except 5 d after treatment. Also, a strong positive correlation between ethylene and the *CmACO1* expression level were observed in 'HS'. The expression of transcription factor CmMYB113, screened from yeast one hybrid library, was induced by exogenous ethylene treatment in 'HS' rather than 'LW'. Moreover, the yeast one hybrid and GUS activity assays indicated that CmMYB113 could activate the transcription of *CmACO1* and *CmSPS1* by binding directly to their promoters, respectively. From the findings, it was revealed that the targeted up-regulation of *CmACO1* and *CmSPS1* by CmMYB113 could be involved in ethylene-dependent sucrose accumulation, which enhanced flavor quality in climacteric melon fruit.