Insight into the *MYB*-related transcription factors involve in regulating the synthesis of floral aroma in sweet osmanthus

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Abstract

As an important part of MYB transcription factor (TF) family, the MYB-related transcription factors have been reported that play diverse roles in regulating the synthesis of secondary metabolites and developmental processes, as well as responding multiple biotic and abiotic stresses in plants. However, little is known regarding their roles in regulating the formation of floral volatile organic compounds (VOCs). In this study, we conducted a genome-wide analysis of MYB-related proteins in *Osmanthus fragrance*, and 212 *OfMYB*-related TFs were classified into three distinct subgroups by the phylogenetic tree. Additionally, we also found that the expansion of the *OfMYB*-related genes was mainly contributed by the segmental duplication events, and all of the duplicated gene pairs had experienced purifying selection. The RNA-seq and qRT-PCR data indicated that the *OfMYB*-related genes were widely expressed in the different organs of *O. fragrance*, and some of them had floral organ-dominated expression patterns. According to the correlation analysis between the expression levels of *OfMYB*-related genes and the contents of the VOCs, six nuclear-located *OfMYB*-related genes (*OfMYB1R*70/114/152/167/182/201) which had the significant correlations with the floral aroma components were identified. Interestingly, only *OfMYB1R201* had transcriptional activity, implying that *OfMYB1R201* could be a positive regulator in the regulation of volatile aroma production. Remarkably, the transient expression results suggested that *OfMYB1R70*, *OfMYB1R114*, and *OfMYB1R201* were all involved in the regulation of aroma components synthesis, in which the *OfMYB1R114* and *OfMYB1R70* are mainly involved in accelerating the *β*-Ocimene, *β*-Ionone and 1-Nonanal formation, by contract, the *OfMYB1R201* is negatively controlling the synthesis of *β*-Ocimene. Our results could deep our knowledge about the functions of MYB-related TFs, and can also supply critical candidate genes for the floral aroma breeding of sweet osmanthus in the future.

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