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ORIGINAL ARTICLE

Isolation and functional characterization of a R2R3-MYB regulator of *Prunus mume* anthocyanin biosynthetic pathway

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Abstract Flower color is an important economic trait of *Prunus mume*, a famous ornamental plant widely cultivated in East Asia. Anthocyanins, acting as major pigments of flower coloration, are biosynthesized via transcriptional regulation of transcription factors (TFs). Many R2R3-MYB TFs have been identified to regulate anthocyanin biosynthetic pathways. However, very little is known about the role of R2R3-MYB TFs regulating anthocyanin biosynthesis in *P. mume*. In our study, the first R2R3-MYB TF (*PmMYBa1*) from *P. mume* has been isolated and characterized. Sequence analysis revealed that *PmMYBa1* contains conserved R2R3 MYB domain and belongs to anthocyanin-related subgroup 6 of R2R3-MYB family. Overexpression of *PmMYBa1* in tobacco contributed to anthocyanin accumulation by activating endogenous anthocyanin-relating genes in the flowers and fruits of transgenic lines. Gene expression analysis showed that almost all of the endogenous structural genes of anthocyanin biosynthesis were obviously up-regulated, as well as bHLH TFs An1a and An1b in the flowers and fruits of *PmMYBa1*-overexpressing tobacco. In contrast, only three structural genes *NtCHS, NtF3H*, and *NtANS* were up-regulated in the leaves. In addition, the expression level of *PmMYBa1* was higher in the anthocyanin-rich red flowers than in white ones and strongly correlated with anthocyanin content in the developing petals of *P. mume*. These findings strongly suggest that *PmMYBa1* is involved in regulating anthocyanin biosynthesis in *P. mume*. Moreover, *PmDFR* and *PmANS* might be potential target genes regulated by *PmMYBa1* in *P. mume* according to the correlation analysis. Isolation and functional characterization of *PmMYBa1* laid a foundation for further exploring the mechanisms of anthocyanin synthesis and provide a potential candidate gene for breeding to manipulate flower colors in *P. mume*.

Keywords Anthocyanin · MYB transcription factor · Transcriptional regulation · *Prunus mume*

Abbreviations

CHS	Chalcone synthase
CHI	Chalcone isomerase
CaMV	Cauliflower mosaic virus
F3H	Flavanone 3-hydroxylase
DFR	Dihydroflavonol 4-reductase
ANS	Anthocyanidin synthase
UFGT UDP-glucose	Flavonoid glucosyltransferase
F3′H	Flavanone 3′-hydroxylase
F3′5′H	Flavanone 3′5′-hydroxylase
TAC	Total anthocyanin content

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