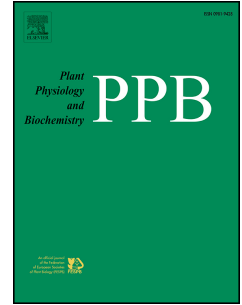


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Anthocyanins and their biosynthetic genes in three novel-colored *Rosa rugosa* cultivars and their parents

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Abstract

The petals of *Rosa rugosa* are generally pink and purple, never yellow. Although new varieties of *R. rugosa* have been bred, no yellow variety has ever been obtained. Therefore, the use of roses in garden settings has been restricted. Three *R. rugosa* hybrid cultivars (*R. rugosa* 'Miaoyu', 'Rudiepiannian' and 'Jiaomeisanbian') were bred in our laboratory using wild *R. rugosa* 'Hunchun' as the female parent and *Rosa xanthina* as the male parent. The petals of these cultivars appear yellow, at least in part; thus, these cultivars represent the first *R. rugosa* with yellow flowers. To investigate the causes of this yellow petal color, the petals of these materials were studied at both the physiological and molecular levels. Anthocyanins are the most important chromogenic substances in plants. In this study, six types of anthocyanins, cyanidin-3-O-glucoside (Cy3G), cyanidin-3,5-di-O-glucoside (Cy3G5G), pelargonidin-3-O-glucoside (Pg3G), pelargonidin-3,5-di-O-glucoside (Pg3G5G), peonidin-3-O-glucoside (Pn3G) and peonidin-3,5-di-O-glucoside (Pn3G5G), were analyzed in the petals of the new *R. rugosa* cultivars and their parents. All of the above anthocyanins were found in the petals of 'Hunchun', and a small amount of Cy3G5G was present in 'Miaoyu' and 'Jiaomeisanbian', but no anthocyanins were found in *R. xanthina* or 'Rudiepiannian'. Moreover, the expression levels of seven structural genes (*RrCHS*, *RrCHI*, *RrF3H*, *RrFLS*, *RrF3'H*, *RrDFR* and *RrANS*) in the flavonoid biosynthetic pathway were quantitatively analyzed via qRT-PCR. We concluded that *RrFLS*, *RrDFR* and *RrF3'H* are the key genes controlling petal color in these different rose varieties.

Key Words: *Rosa rugosa*; Hybrid; Yellow flowers; Flavonoids; Anthocyanins; Gene expression

Highlights

RrF3'H, a key gene in the flavonoid pathway, was cloned for the first time from the petals of wild *R. rugosa* 'Hunchun' at the initial opening stage.

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