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Characterization of genes involved in anthocyanin synthesis in developing carnation flower

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Objectives

This work was carried out to find out a relationship between gene expression and flower color in carnation cultivars with yellow, white and red color flowers, respectively.

Materials and Methods

1. Material :

Plant - white flowered Kaly, red flowered Red queen, and yellow flowered Rigatta carnation (*Dianthus caryophyllus*) cultivars

2. Methods :

mRNA was isolated from flower bud of the three carnation cutivars at each of the following five stages. Stage 1, closed flower buds, 20-mm long. Stage 2, just opening flower buds, 25-mm long. Stage 3, opening flower buds. The visible part of the petals is 1-mm long. Stage 4, the visible part of the petals is 5-mm long. Stage 5, the visible part of the petals is 10-mm long.

Results and Discussion

The cDNA clones of chalcone isomerase(CHI), chalcone synthase(CHS), dihydroflavonol 4-reductase(DFR) and anthocyanidin synthase(ANS) were obtained by reverse transcription-polymerase chain reaction (RT-PCR). Transcriptional expression level of these genes measured in the developing petals of Kaly, Rigatta and Red queen carnation in developing flowers. In the white flowered Kaly cultivars, the CHI expressed in all of the flower developmental stages, CHS expressed until the opening stage of flower bud (Stage 3), and DFR and ANS didn't expressed in all the stages. In the yellow flowered Rigatta cultivar, only CHS and CHI were expressed in the early stages of the flower development. Finally, the Red queen, red flowered carnation cultivar showed the differential expression in the early and late stages. The CHI and CHS expressed in all of the flower development, but DFR and ANS expressed in late stages after flower bud open.

On the basis of these results, relationships between genetical expression and carnation flower color were found. In detail, chalcone-related compounds that synthesized by CHS involved in the yellow flower color, flavone- and flavonol-related compounds being synthesized by CHI involved in the white flower color, and anthocyanidin-related one synthesized by DFR and ANS made the red flower color.

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