Title Differential expression levels of ethylene biosynthetic pathway genes during senescence of long-lived carnation cultivars

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Abstract

Ethylene production and the expression of ethylene biosynthetic pathway genes of some carnation cultivars with a long vase life (‘Miracle Rouge’, ‘Miracle Symphony’ and ‘Sandrosa’) and a cultivar with a normal vase life (‘White Sim’) were investigated. None of the long-life cultivars exhibited normal climacteric-like ethylene production, or petal in-rolling during senescence, but they did exhibit slow petal desiccation. Ethylene production rates from senescing flowers were very low in all long-life cultivars, although slightly higher in ‘Sandrosa’ than in the two other long-life cultivars. Aminoethoxyvinylglycine (AVG) treatment prolonged flower life in ‘Sandrosa’, but did not affect flower life in ‘Miracle Rouge’ and ‘Miracle Symphony’, which indicated a role of 1-aminocyclopropane-1-carboxylate synthase (ACS) only in ‘Sandrosa’. 1-Aminocyclopropane-1-carboxylate (ACC) treatment markedly accelerated senescence of ‘Sandrosa’ but had only a small effect on ‘Miracle Rouge’ and ‘Miracle Symphony’, suggesting that ACC oxidase (ACO) was inhibited or downregulated in the two ‘Miracle’ cultivars. The levels of *DC-ACS1*, *DC-ACS2* and *DC-ACO1* transcripts in the gynoecium and petals were high at 5 and 6 days after harvest in ‘White Sim’ but were below the detection levels in ‘Miracle Rouge’ and ‘Miracle Symphony’. In ‘Sandrosa’, *DC-ACS1* was below the detection limit, whereas the expression of *DC-ACS2* and *DC-ACO1* was very low. The results show that long vase life in these carnation cultivars, ‘Miracle Rouge’, ‘Miracle Symphony’ and ‘Sandrosa’, is correlated with low *DC-ACS1*, *DC-ACS2* and *DC-ACO1* expression in the gynoecium and petals.