Scent emissions and expression of scent emission-related genes: A comparison between cut and intact carnation flowers

Kyutaro Kishimoto and Kenichi Shibuya

Scientia Horticulturae 281: 109920. (2021)

Abstract

Although the physiological states of intact and cut flowers are expected to be significantly different, the floral scent emissions of these two conditions has yet to be compared. We compared the scent emissions from intact and cut flowers using carnation (*Dianthus caryophyllus* L.) cultivars with two different scent-types—a fruity scent based on benzenoid methyl benzoate and a spicy scent based on eugenol. Methyl benzoate or eugenol, which were the principal scent components, always had the highest percentage (> 30 %) in both intact and cut flowers from flower opening to wilting. The total emissions from intact flowers remained at a similar level for approximately 6 days after flower opening, and then gradually decreased with flower senescence. The total emissions from cut flowers were highest on the day of flower opening and then decreased more rapidly than emissions from intact flowers. Furthermore, the duration of noticeable scent of cut flowers was estimated to be shorter than that of intact flowers. The expression of various scent emission-related genes encoding floral volatile benzenoid/phenylpropanoid biosynthesis enzymes, adenosine triphosphate-binding cassette transporters, and MYB transcription factors increased with flower opening and were accompanied by scent emissions. However, the expressions of most of these genes were not affected by cutting, suggesting that the decrease in scent emissions from cut flowers is unlikely due to changes in gene expression. Recently, we reported that cutting accelerates the decrease in sugar content and increases ethylene production in carnation petals, resulting in hastened flower senescence. Therefore, the rapid decrease in scent emissions from cut flowers may be due to a decrease in sugars, which are substrates for the scent components.