

Molecular understanding of postharvest flower opening and senescence

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Molecular Horticulture 1: 7. 2021.

Abstract

Flowers are key organs in many ornamental plants, and various phases of flower development impact their economic value. The final stage of petal development is associated with flower senescence, which is an irreversible process involving programmed cell death, and premature senescence of cut flowers often results in major losses in quality during postharvest handling. Flower opening and senescence are two sequential processes. As flowers open, the stamens are exposed to attract pollinators. Once pollination occurs, flower senescence is initiated. Both the opening and senescence processes are regulated by a range of endogenous phytohormones and environmental factors. Ethylene acts as a central regulator for the ethylene-sensitive flowers. Other phytohormones, including auxin, gibberellin, cytokinin, jasmonic acid and abscisic acid, are also involved in the control of petal expansion and senescence. Water status also directly influences postharvest flower opening, while pollination is a key event in initiating the onset flower senescence. Here, we review the current understanding of flower opening and senescence, and propose future research directions, such as the study of interactions between hormonal and environmental signals, the application of new technology, and interdisciplinary research.