

**Title** Role of transcription factors in regulating ripening, senescence and organ abscission in plants

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### **Abstract**

**Purpose of the review:** Ripening and senescence of harvested horticultural crops are active processes initiated by internal and environmental factors. The energy status in cells of harvested horticultural crops is a fundamental feature of ripening and senescence. Considerable evidence suggests that the energy supply in cells of harvested horticultural crops during ripening and senescence is the key event. There have been great advances in the understanding of the role of energy in ripening and senescence of harvested horticultural crops in recent years. This brief review article focuses on energy production, level and metabolism in harvested horticultural crops during ripening and senescence in relation to biochemical and physiological activities, with an emphasis on the beneficial effects of the energy-related handling.

**Main findings:** Senescence or browning of harvested horticultural crops is associated with a limited availability of energy. Increased membrane permeability and enhanced reactive oxygen species production of harvested horticultural crops are related to low ATP production and adenylate energy charge (AEC) level. Exogenous ATP supply exhibits potential for browning control and quality maintenance of litchi fruit and vase-life extension of cut carnation flowers. Exposure of longan or litchi fruit to pure oxygen significantly increases production of ATP and ADP in adenylate-related pool, indicating a high AEC level, and delays pericarp browning during storage, but high oxygen treatment reduces energy production and accelerates ripening and senescence of banana fruit.

**Limitations:** A picture of the sequence of the role of energy status in ripening and senescence of harvested horticultural crops is still unclear. Particularly, energy production and metabolism in harvested horticultural crops during ripening and senescence in relation to biochemical and physiological activities at the molecular level needs to be elucidated further.

**Directions for future research:** Detailed molecular, biochemical and physiological studies on energy production and metabolism are needed to gain a better understanding of the role

of energy status in ripening and senescence of harvested horticultural crops. Further research is needed to clarify the effects of the energy-related handling on shelf life extension and quality maintenance of harvested horticultural crops. Finally, the influence of energy status and metabolism on the main mechanism of ripening and senescence of harvested horticultural crops need to be further elucidated.