

# A comprehensive study of factors affecting postharvest disorder development in celery

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## Abstract

Fresh-cut celery is an economically important crop, susceptible to postharvest disorders such as browning at cut ends, which can compromise quality and affect freshness perception. The study herein represents the most comprehensive attempt to date to determine the factors that mediate celery postharvest disorders and uncover the physiological and biochemical mechanisms involved. Three main experiments were conducted over two years, covering the early and late Spanish season and the late UK season. The aim of the experiments was to study: a) the effect of seasonal variation and horticultural maturity on shelf-life (20 °C) of fresh-cut celery; b) the effect of postharvest application of 1-methylcyclopropene (1-MCP) and continuous ethylene supplementation on browning and pithiness development during cold storage (5 °C); and c) the effect of preharvest deficit irrigation on the quality of fresh-cut celery during shelf-life (20 °C). Lesser horticultural maturity increased browning and pithiness with browning severity being positively correlated with chlorogenic acid concentrations in celery cut-ends. Ethylene supplementation accelerated the metabolic activity of celery, leading to early senescence. We found that 1-MCP suppressed respiration rate and delayed browning. Deficit irrigation promoted browning, which coincided with a rapid increase in abscisic acid and its main catabolite phaseic acid during storage. Mild deficit irrigation promoted the increase of chlorogenic acid after 6 d of storage, while severe deficit irrigation did not show this increase. These findings will help growers and retailers standardise industry practices ensuring uniform quality and better shelf-life estimations.