

Title Factors affecting ethylene sensitivity and 1-MCP response in tulip bulbs
Author Susan Liou and William B. Miller
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Abstract

Ethylene has many detrimental effects on tulip quality, including increased bulb gummosis and respiration, reduced rooting, and increased flower bud abortion. In this work, bulbs of four cultivars were exposed to ethylene ($10 \mu\text{L L}^{-1}$, with or without 1-MCP pretreatment) for different durations or at different times during the fall storage period. An experiment on post-ethylene storage temperature was conducted to test the hypothesis that a period of warm temperature after ethylene exposure is necessary to fully express ethylene injury symptoms that are seen months later after cooling and forcing. The degree of damage (flower abortion) in the sensitive cultivars 'Apeldoorn' and 'World's Favourite' increased as the duration of ethylene exposure increased to 10 and 16 d, respectively. This effect strongly depended on the timing of ethylene stress, as bulbs given ethylene late in the storage season showed more severe injury than early-treated bulbs. Bulbs that were cooled (9°C) immediately after ethylene stress had higher flowering percentages than those stored at 17°C for 2–4 weeks after ethylene stress, demonstrating that a period of warm temperature after ethylene exposure is necessary to allow full expression of the injury. This response was dependent on the cultivar and the timing of ethylene stress. When 1-MCP ($1 \mu\text{L L}^{-1}$) was applied within 21–28 days prior to the start of ethylene exposure (2 weeks, $10 \mu\text{L L}^{-1}$), the ethylene sensitive varieties were protected. Putative ethylene-resistant cultivars 'Friso' and 'Sevilla' were unaffected by ethylene and showed no response to 1-MCP.