Title Control and regulation of the gravitropic response of cut flowering stems during storage and horizontal transport

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Abstract

One of the major postharvest problems of cut flowers with actively growing spikes is their bending as a response to gravity, mainly during horizontal transport. The possible involvement of cytosolic calcium ([Ca^2]cyt) as a second messenger in this hormone-induced gravitropic bending of flower shoot regions capable of linear growth after harvest, was examined by application of various calcium-related agents. The gravitropic bending of cut Snapdragon, *Eremurus*, mini-gladiolus, *Ornithogalum*, *Lupinus* and Anemone was significantly inhibited by application of the Ca^{2+} chelators EDTA, EGTA and CDTA. While the Ca^{2+} chelator BAPTA inhibited equally well the bending of gravi-stimulated snapdragon and *Ornithogalum* spikes, the Ca^{2+} channel blocker $LaCl_3$ was effective in inhibiting bending of snapdragon only, suggesting that these two cut flowers may have different modes of extruding Ca^{2+} outside the cytosol. Conversely, application of $CaCl_2$ or its agonists, Bay K-8644 and A23187, stimulated their bending. The formation of curvature in snapdragon and *Ornithogalum* was accompanied by an asymmetric distribution of ethylene production between lower and upper longitudinally halved stem sections. Pulsing the spikes with CDTA, which inhibits bending, abolished completely this gravity-induced ethylene gradient across the stem. Ethylene inhibitors (STS, $CoCl_2$ and NBD) were also effective in inhibiting the gravitropic response of snapdragon spikes. The results suggest that changes in [Ca^{2+}]cyt may be involved in the mechanism of auxin action, manifested as increased ethylene production, leading to stem elongation and subsequent gravitropic bending.