

Title Hydraulic conductivity of cut flower stems and aquaporins function
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Abstract

Cut flowers are peculiar *biological* systems whose shelf life is strictly dependent on their ability to maintain tissues hydration overtime. Understanding the physiology of water homeostasis in cut flower stems is therefore critical to identify measures to control cellular turgor throughout their shelf life. Aquaporins may play an important function in this system since they can mediate transcellular water fluxes between parenchima cells and/or parenchima cells and xylem vessels. By using chemical inhibitors and activators of aquaporin function, here we provide evidence for a role of these proteins in transcellular water movement in cut flower stems. Rose stems ('Red France') were kept in vases containing deionized water and exposed for 24 hours to forskolin, an activator of aquaporins function (previously dissolved in ethanol) or two inhibitors of aquaporins function, silver nitrate and mercuric chloride plus control treatments (water and water + ethanol). After 24-h treatment with activator/inhibitors, cut stems were placed in graduated cylinders and maintained at room temperature for an additional week. At day 1, 3 and 5 after treatments, stem hydraulic conductivity and stomatal conductance were measured. Stems of 20 cm were inserted in a pressure chamber containing deionized water and exposed to increasing pressures (0.05, 0.1, 0.2, 0.3 and 0.4 MPa). The efflux at each pressure was collected and normalized for the stem section. The hydraulic conductivity was calculated as the slope of the relationship water flux vs. pressure. During the vase-life, the stem hydraulic conductivity decreased significantly. Mercuric and silver treatments both inhibited the hydraulic conductivity, whereas forskolin significantly increased it compared to its relative control. These results are consistent with an aquaporins mediated transcellular water flux in cut flower stems. Stomatal conductance was positively correlated to stem hydraulic conductivities indicating a possible coordination between these functions.