

Title 1-MCP partially alleviates dehydration-induced abscission in cut leaves of the fern *Nephrolepis cordifolia*

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Abstract

Fern leaves, also called fronds, are often used in bouquets. Leaves of the sword fern (*Nephrolepis cordifolia*) consist of a central vascular tissue, with numerous leaflets (pinnae) at each side. Leaves that have been cut and immediately placed in water show abscission of the pinnae, starting from about day 4 of vase life, with 50% pinnae abscission on day 13. The onset of pinnae abscission was hastened by a period of dehydration (3, 6, 9 or 12 h at 25 °C). The time to 50% pinnae abscission was between 7.0 and 4.7 days after 3 h and 12 h of dehydration, respectively. Dehydration treatments might induce air emboli in the xylem, but in these experiments did not inhibit water uptake. Dehydration did increase the rate of ethylene production of the cut leaves throughout vase life. A 3 h treatment with 1-MCP at concentrations of 200 or 300 nL L⁻¹ prior to the period of dehydration reduced the rate of ethylene production and reduced the rate of abscission. 1-MCP treatments were also effective if given after the period of dehydration. The data show that pinnae abscission limits the vase life of cut leaves of the sword fern, and that a short period of water stress drastically increases the rate of abscission. The increase in pinnae abscission was correlated with an increase in ethylene production. As 1-MCP alleviated the effect of dehydration on pinnae abscission, the dehydration effect involved ethylene perception. The data suggest that a small water stress induced an autocatalytic rise in ethylene production which was the direct cause of the increase in pinnae abscission.