Title Role of ethylene in the lack of floral opening and in petal blackening of cut lotus (*Nelumbo nucifera*) flowers

Author Wachiraya Imsabai**,** Saichol Ketsa and Wouter G. van Doorn

Citation Postharvest Biology and Technology, Volume 58, Issue 1, October 2010, Pages 57-64

Keywords *Nelumbo nucifera*; ACC oxidase; ACC synthase; *ACO*; *ACS*; Lotus flower; Ethylene; Ethephon; Flower opening; 1-MCP; Petal blackening

Abstract

Lotus flowers (*Nelumbo nucifera*) are cut at the bud stage, kept dry and brought to a temple as part of a religious tradition. When placed in water, even if this is done immediately after cutting, the flowers fail to open and show rapid petal blackening. We tested the role of ethylene in these processes. The rate of ethylene production by the cut flowers (which had been held dry for 2 h after harvest and were then placed in water) transiently increased, with a maximum 9–15 h after harvest. This was accompanied by an increase in ACC synthase activity, while the ACC oxidase activity remained unchanged. Exogenous ethylene, applied at 0.1–10 μL/L, for 3 h prior to vase life or continuously during vase life, had no effect on petal blackening. Continuous inclusion in the vase water of ethephon, a compound that releases ethylene, stimulated the rate of ethylene production, and accelerated petal blackening. Treatment with 1-methylcyclopropene (1-MCP), an inhibitor of the ethylene receptor, reduced the rate of ethylene production and delayed initial petal blackening by about 2 d. None of these treatments had an effect on flower opening. Two partial cDNAs were isolated from the petals, one encoding a 1-aminocyclopropane-1-carboxylic acid (ACC) synthase (*Nn-ACS*) and the other an ACC oxidase (*Nn-ACO*). The transcript abundance of both genes had increased by 12 h after the onset of vase life. 1-MCP decreased the transcript abundance of both genes, whereas ethephon increased it. It is concluded that cut lotus flowers placed in water show an increase in the rate of ethylene production, apparently due to increased ACS activity and the expression of one or more *ACS* genes. Ethylene seems part of the causal chain leading to early petal blackening, but it is not the cause of the lack of flower opening.