Title The effects of 1-MCP in cyclodextrin-based nanosponges to improve the vase life of *Dianthus caryophyllus* cut flowers

Author Ludovica Seglie, Katia Martina, Marco Devecchi, Carlo Roggero, Francesco Trotta and Valentina Scariot

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Abstract

The present research investigated the effects of a non-volatile formulation of 1-methylcyclopropene (1-MCP) embedded in different cyclodextrin (CD)-based nanosponges (NSs) to extend the postharvest longevity of an ethylene-sensitive carnation cultivar. Cut flowers of *Dianthus caryophyllus* L. 'Idra di Muraglia' were treated with α- and β-CD-based nanosponge-1-MCP complexes (α- and β-NS complexes) in tap water to achieve two different concentrations of active ingredient (0.25 and 0.5 μL L^{-1}). Treated flowers were compared to cut stems exposed to equivalent concentrations of volatile 1-MCP as well as a tap water control with or without pure α- and β-NS. Identical nanoporous compounds were applied by perfusion to yield a total of 15 treatments. Twenty-four hours after the treatments were applied, the cut flowers were exposed to exogenous ethylene (1 ± 0.2 μL L^{-1}) for 24 h. The postharvest carnation flower and leaf quality in addition to ethylene production levels were determined daily (beginning 24 h after treatment). None of the α-NS complex applications statistically improved the vase life of cut flowers; however, β-NS complexes were effective in preventing senescence, reducing ethylene production (measured at nearly nil after 11 d), and maintaining original petal color longer. These results were particularly strong at the lowest concentration (0.25 μL L^{-1}) of β-NS complex. Overall, this method promoted cut flower longevity (loss of ornamental value after 14.7 d; complete damage at day 18.5) better than the commercial 1-MCP gaseous application method.