Title β-Cyclodextrin-based nanosponges as carriers for 1-MCP in extending the postharvest longevity of carnation cut flowers: an evaluation of different degrees of cross-linking

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

Citation Plant Growth Regulation, 65, Number 3, 505-511, 2011

Keywords Antiethylene compound; *Dianthus caryophyllus*; Ethylene; Flower senescence; Nanocolloidal molecules; Shelf life

Abstract

This study investigated the influence of different degrees of cross-linking of β-cyclodextrin-based nanosponges (β-CD-NSs) on the activity of the incorporated 1-methylcyclopropene (1-MCP) to extend the postharvest longevity of carnation cut flowers. The polymeric β-CD-NSs were synthesized from cyclodextrins at three varying reticulations, β-CD-NS 1:2, β-CD-NS 1:4, and β-CD-NS 1:8. These carriers were supplied to carry the nonvolatile formulations of 1-MCP at two different concentrations (0.25 and 0.5 μL L^{-1}, ai) through stem and tissues of cut flowers of *Dianthus caryophyllus* L. 'Idra di Muraglia', both sprayed and in vase suspension. Treated cut flowers were compared to those receiving like concentrations of commercially prepared gaseous 1-MCP and to neat β-CD-NS 1:2, β-CD-NS 1:4, and β-CD-NS 1:8. Visual checks for symptoms of senescence alteration (VS), petal color variation, and endogenous ethylene production were registered daily. The β-CD-NS 1:2, β-CD-NS 1:4, and β-CD-NS 1:8 complexes favored decorative value maintenance in carnation cut flowers. In particular, the lowest suspended concentration (0.25 μL L^{-1}) of the β-CD-NS 1:8 complex proved best for maintaining cut flower ornamental quality. β-CD-NS 1:8 treated flowers also appeared longer-lived than those treated with both doses of commercial gaseous 1-MCP. Data on petal color variation and endogenous ethylene production were strictly correlated with VS results. The potential for the formulated 1-MCP-loaded β-CD-NS suspension to induce prolonged vase life was demonstrated. Its use could yield benefits, such as a reduction in total dose and frequency of administration.