

# Nanosilver and sucrose delay the senescence of cut snapdragon flowers

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Postharvest Biology and Technology, Volume 165, July 2020, 111165

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## Abstract

Snapdragon (*Antirrhinum majus* L.) is one of the most important annuals grown for cut flowers, but its vase life in water is relatively short. In this study, the effects of nanosilver (NS) on the vase life of cut snapdragon and effects on physiology, biochemical and morphology levels were investigated. Xylem vessel blockages started to appear soon after harvest. NS prevented tylose formation, but not the blockages caused by bacteria. Cut flowers treated with 1 mg L<sup>-1</sup> NS with 2 % sucrose had a longer vase life than those held in water or in NS alone, and improved flower opening, coloration and higher relative water content of flowers in the lower (older) part of the spike. Carbohydrate accumulated in flowers in the NS solution. NS limited increased electric conductivity, and with sucrose decreased the pH of cell sap. NS also limited the increase in the malondialdehyde content, especially in the upper (younger) part of spikes where also the hydrogen peroxide content was much lower than in flowers from the lower spike parts. The activities of antioxidative enzymes were higher in the NS-treated flowers, especially when the NS solution was supplemented with sucrose, and the nuclei and epidermis degradation was delayed. It is evident that the presence of NS in the holding solution, especially when supplemented with sucrose, delays and reduces the severity of all senescence symptoms, thereby extending the useful vase life of snapdragon.