

Nano-silver pretreatment delays wilting of cut gardenia foliage by inhibiting bacterial xylem blockage

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Abstract

Gardenias (*Gardenia jasminoides* Ellis var. ‘fortuniana’) have commercial importance as cut foliage but are prone to severe postharvest water deficit and quick wilting. Herein, we investigated the efficacy of pretreatment with nano-silver (NS), a strong antibacterial agent, in enhancing water relations and the vase life of cut gardenia foliage. Compared with the deionized-water controls, pretreatment with NS at 10, 15, 20, 25, or 30 mg L⁻¹ for 24 h significantly extended the vase life of cut gardenias. The most effective NS concentration was 15 mg L⁻¹, which promoted the longest (15.2 days) vase life extension, i.e., 310.2% of that of the control treatment. In addition, pretreatment with 15 mg L⁻¹ NS effectively delayed wilting by maintaining a higher water balance value and relative fresh weight when compared with untreated cut foliage. Scanning electron microscopy revealed that these higher values were due to an improved water uptake as a result of the alleviation of bacterial xylem blockage at the stem-ends. Furthermore, Ag concentration was remarkably higher at the stem-ends of NS-pretreated cut gardenias than in any other tissues. Overall, these results demonstrate that NS pretreatment effectively inhibited bacterial growth at the cut stem-ends, and helped maintain a favorable water balance, thereby delaying wilting and extending the vase life of cut gardenias.