

Moringa extract preserved the vase life of cut roses through maintaining water relations and enhancing antioxidant machinery

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Abstract

The vase life of industrial cut flowers is relatively short and hence seeking eco-friendly strategies to extend its commercially needed. This research was consequently undertaken to study either moringa leaf extract (MLE) or moringa seed extract (MSE) can be applied as a natural preservative to prolong the vase life of cut roses. Both applications were selected and tested because they are natural and have no environmental hazards. Cut flowers of *Rosa hybrida* cv. 'Upper Class' were overnight pulsed in either MLE or MSE at 1:40, 1:30, 1:20, 1:10 (extract/water, v/v) and then transferred to distilled water. The vase life was significantly extended by MLE or MSE, more so with 1:30 and 1:20 extracts. Both MLE and MSE resulted in 8 and 5 days, respectively, longer than the untreated flowers. Pulsing with MLE or MSE significantly maintained the relative water content (RWC) and suppressed the microbial growth at the stem base. However, although SEM investigation showed few bacteria on the cut ends of the flowering stems pulsed with MLE or MSE even on day 5, there was no visual bacterial blockage observed in the xylem vessels. Contrary, the cut ends of untreated flowers were completely covered with bacterial cells and a lot of bacteria were detected inside the xylem vessels. SEM investigation also revealed that MLE or MSE treatment reduced the stomatal aperture which was widely opened in untreated flowers. Additionally, MLE or MSE pulsing increased proline content, reduced H₂O₂ production and lipid peroxidation, enhanced total phenol content, radical scavenging and the activity of CAT and POX enzymes, which altogether resulted in maintained membrane stability. Expression of *RhPIP1*, *RhTIP1* and *RhLAC* genes were considerably induced in control samples up to day 4 relative to MLE or MSE treated flowers, but no significant difference was observed between both moringa extracts in this respect. In conclusion, MLE or MSE treatment extended the vase life of cut roses via keeping water relations and enhancing the antioxidant machinery, the impact was more pronounced with MLE. Therefore, MLE as a novel preservative is recommend for future using in floral industry.