Phenylmethylsulfonyl fluoride pulse and cold storage independently or synergistically alleviate postharvest losses in *Dianthus chinensis* L.

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Abstract

The present study focuses on examining the effect of phenylmethylsulfonyl fluoride (PMSF) at three distinct temperatures: 5 °C, 10 °C and room temperature (RT, i.e., 25 ± 2 °C) on the postharvest attributes of *Dianthus chinensis* flower stems. The flower stems with the most mature floral bud at the paint brush stage (i.e., one day before anthesis) were harvested and uniformly re-cut in the laboratory. These stems were then divided into three groups, with each group further categorized into four sets. The three groups of flower stems were stored for 72 h in distilled water (wet stored) at 5 °C, 10 °C and RT, respectively. At each temperature, one set designated as control was kept unpulsed and the other three sets were pulsed for 1 h with 0.05 mM PMSF before, during (i.e., after 35 ½ h) and after storage, respectively. After 72 h wet storage and PMSF pulse, the flower stems were transferred to conical flasks containing 0.05 M sucrose and the effect of different treatments was assessed in the subsequent days at room temperature. Flower stems treated with PMSF pulse or cold storage individually or in combination showed significant improvement of vase life, with the maximum value of 22 days registered for flower stems pulsed with PMSF before wet storage at 5 °C for 72 h, which was 14, 12 and 5 days more than the control at RT, 10 °C and 5 °C, respectively. The improved vase life of flower stems was marked by enhanced floral diameter, higher levels of soluble proteins and sugars as compared to the control. The flower stems with improved longevity maintained lower content of total phenols and higher membrane stability index, besides exhibiting a significant alleviation in the deteriorating effects of lipid peroxidation and lipoxygenase activity on membrane integrity. Further, the flower stems with improved postharvest characteristics were also found to be associated with elevated activity of antioxidant enzymes like superoxide dismutase, catalase, and ascorbate peroxidase.