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Combined spermine and spermidine postharvest treatment attenuates pomegranate cv ‘sawa’ fruit physiological losses and maintain fruit quality by improving biochemical and antioxidative attributes at ambient conditions

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Abstract

Fresh fruit are perishable commodity prone to rapid postharvest losses in quantity and quality. Certain postharvest intervention including postharvest treatment, treatment with polyamines, had been known to reduce these losses. Keeping in view a study was carried out to explore the effect of exogenous application of polyamines on fruit quality of pomegranate cv. ‘Sawa’. In this experiment, physiological mature pomegranate fruit were dipped in 2 mM aqueous solution of polyamines [Spermine (SPM), Spermidine (SPD)] individually as well as in combination using Tween-20 as a surfactant for 5 minutes and were kept at ambient conditions ($25 \pm 2^\circ\text{C}$, 60–65 % RH) for 15 days. Experimental design was two factors factorial under CRD (Completely Randomised Design) arrangement. The treated fruit were observed for fruit physiological attributes (ethylene production, respiration rate, fruit weight loss), aril biochemical attributes [total soluble solids (TSS), titratable acidity (TA), ripening index (TSS:TA ratio)] and aril antioxidative attributes [total phenolic contents (TPC), total antioxidative activity, anthocyanin, activities of superoxide dismutase (SOD), peroxidase (POD) and catalase (CAT) enzymes]. Results indicated that all the treated and untreated fruit exhibited physiological, biochemical and antioxidative fruit quality losses at ambient conditions as the shelf period progressed. However, at day-15 of shelf, pomegranate fruit treated with combined SPM + SPD treatment exhibited lower ethylene production ($0.18 \mu\text{mole kg}^{-1}\text{hr}^{-1}$), respiration rate ($0.54 \text{ mmole kg}^{-1}\text{hr}^{-1}$), fruit weight loss (10 %), fruit firmness (24 N), CAT enzyme activity and higher TA (0.69 %), TPC ($107 \text{ mg GAE } 100\text{g}^{-1}$), antioxidative activity (56 % DPPH) and activities of SOD (31 U mg^{-1} of protein) and CAT (7.4 U mg^{-1} of protein) enzymes as compared to untreated or other treatment. Overall, combined SPM and SPD treatment lessened overall fruit losses and maintained fruit quality of pomegranate fruit at ambient conditions irrespective to shelf duration.

Keywords: Fruit quality, polyamines, postharvest water dipping, *Punica granatum*