Enhanced chilling tolerance of pomegranate fruit by edible coatings combined with malic and oxalic acid treatments

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Abstract

Chilling injury (CI) is one of the main factors in reducing pomegranate quality during cold storage. This study was conducted to evaluate the influence of polysaccharide based edible coatings in combination with organic acid treatments on CI of pomegranate cv. Rabbab-e-Neyriz during cold storage. Fruit were treated with carboxymethyl cellulose (CMC, 2% w/v) and chitosan (CH, 1.5% w/v) edible coatings alone or in combination with oxalic acid (5 mM OA and 10 mM OA) and malic acid (50 mM MA and 100 mM MA). After treatment, fruit stored at 2 °C, and 80–90% relative humidity (RH) for 120 days. Results indicated that CI decreased in treated fruit during cold storage as compared to control (non-treated fruit). Electrolyte leakage (EL) and malondialdehyde (MDA) reduced with combined treatments. Hydrogen peroxide (H_2O_2) was also reduced in treated fruit during storage. Total phenolic content (TPC), antioxidant activity (AA), and catalase activity (CAT) were higher in treated than control fruit during storage. At the end of storage, the most TPC was found in fruit treated with CH + 50 mM MA and CH + 5 mM OA. Also, the most AA was found in fruit treated with CMC + 5 mM OA and CH + 5 mM OA. In addition, lower unsaturated/saturated fatty acids (unSFA/SFA) ratio obtained in control and fruit treated with 100 mM MA and CMC + 100 mM MA treatments. Overall, our results showed that CH combined with 5 mM OA and CH combined with 50 mM MA were the most effective treatments for ameliorating chilling injury.