Exogenous melatonin applying confers chilling tolerance in pomegranate fruit during cold storage

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Abstract

In this study, the mechanism hired by melatonin treatments (0, 1, 10, 100 and 1000 µM) for conferring chilling tolerance in pomegranate fruit during storage at 4 °C for 120 days was explored. Melatonin treatment at 100 µM meaningfully conferred chilling tolerance in pomegranate fruit manifesting by lower husk browning accompanying by higher membrane integrity representing by lower electrolyte leakage and malondialdehyde (MDA) accumulation. Higher membrane integrity in pomegranate fruit treated with melatonin may arise from lower H_2O_2 accumulation owing to higher reactive oxygen species (ROS) scavenging enzymes catalase (CAT), superoxide dismutase (SOD), ascorbate peroxidase (APX) and glutathione reductase (GR) activity. In addition to higher ROS scavenging enzymes activity, higher membrane integrity in pomegranate fruit treated with melatonin may ascribe to lower membrane degrading enzymes phospholipase D (PLD) and lipoxygenase (LOX) activity. Also, higher phenols accumulation giving rise to higher DPPH scavenging capacity arising from higher phenylalanine ammonia-lyase (PAL) enzyme activity concomitant with lower polyphenol oxidase (PPO) enzyme activity may be vital for conferring chilling tolerance in pomegranate fruit by exogenous melatonin applying. Accordingly, exogenous melatonin applying serves as a safe beneficial strategy for conferring chilling tolerance in pomegranate fruit during cold storage.