

Changes in the activity of proline-metabolising enzymes is associated with increased cultivar-dependent chilling tolerance in mangos, in response to pre-storage melatonin application

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Postharvest Biology and Technology, Volume 182, December 2021, 111702

Abstract

Exogenous melatonin (100 μ M) was applied to four mango fruit cultivars, namely, 'Langra', 'Dashehari', 'Chaunsa', and 'Gulab Jamun', and subsequently stored at 5 ± 1 °C for 28 d. 'Langra' mangos responded best to melatonin treatment by increasing their chilling tolerance during storage, while 'Gulab Jamun' mangos did not experience any significant effect. MT reduced chilling injury index by 4.8, 1.8, 1.7 and 1.1 times in 'Langra', 'Chaunsa', 'Dashehari' and 'Gulab Jamun', respectively, as compared to non-treated mangos, after 28 d of storage at 5 ± 1 °C. This efficacy of MT on quality preservation at chilling temperatures was associated with delayed ethylene production and respiration rate, a lower concentration of malondialdehyde, as well as maintenance of physicochemical properties like firmness, pH, total soluble solids, and titratable acidity in most cultivars, except for 'Gulab Jamun'. Additionally, MT treated 'Langra' mangos showed 1.39 times higher proline content, as compared to non-treated mangos. This was likely due to higher activities of Δ^1 -pyrroline-5-carboxylate synthetase and ornithine- δ -aminotransferase, in addition to lower proline dehydrogenase activity at 28 d of storage. This effect was not apparent on 'Gulab Jamun' mangos, whereas 'Chaunsa' and 'Dashehari' mangos showed a moderate response to the MT treatment on their physicochemical properties and proline metabolism. Thus, our data suggests that MT treatment exerted a cultivar-dependent control on signs of chilling injury.