Performance of calcium nanoparticles blending with ascorbic acid and alleviation internal browning of 'Hindi Be-Sennara' mango fruit at a low temperature

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## Abstract

The performance of calcium nanoparticles (CaNPs) blending in ascorbic acid (AA) to alleviate internal browning symptoms of 'Hindi Be-Sennara' mango fruit under cold storage otherwise the impacts of CaNPs-AA on browning enzyme activities such as polyphenol oxidase (PPO, EC: 1.14.18.1) and Phenylalanine ammonia-lyase (PAL, EC: 4.3.1.24) were assessed. The mango fruits were immersed with CaNPs with AA at the different concentration (0, 6, and 9 mM) and stored at low temperature (6 °C and 95% RH) for 35 days. Fruit samples were picked every five days interval. The visual measurement of internal browning index (IB-index) was monitored. The chemical analysis, for instance, the total phenol (TP), and flavonoids (FL) content were measured. Moreover, the cell wall degradation enzymes for example lipoxygenase (LOX; EC: 1.13.11), pectinase (PT; EC: 3.2.1.15), cellulase (CEL; EC: 3.2.1.4), and cell membrane leakage percentage were measured. However, the cell wall termination compounds such as lipid peroxidation (malondialdehyde, MDA), and DPPH radical were determined. The CaNPs-AA <sub>9 mM</sub> reduced significantly the IB incidence, maintained the phenolic compounds content by preserving cell wall structure and minimizing action of both PPO and PAL activities during cold storage. Moreover, the changes in cell wall degradation enzyme activities were inhibited by CaNPs-AA <sub>9 mM</sub> treatment so less leakage percentage. In the same trend, the lowest accumulation of MDA and the highest concentration of DPPH was monitored too. As the main conclusion, using the CaNPs-AA 9 mM treatment for 24 h to fruit exhibited significantly a reduction of internal browning incidences of mango during cold storage.