Title Mode of action of nitric oxide in inhibiting ethylene biosynthesis and fruit softening during ripening and cool storage of 'Kensington Pride' mango

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Abstract

The mode of action of nitric oxide (NO) in inhibiting ethylene biosynthesis and fruit softening during ripening and cool storage of mango fruit was investigated. Hard mature green mango (*Mangifera indica* L. cv. 'Kensington Pride') fruit were fumigated with 20 μL L^{-1} NO for 2 h at 21 °C and allowed to ripen at 21 ± 1 °C for 10 d, or stored at 13 ± 1 °C for 21 d. During ripening and cool storage, ethylene production and respiration rate from whole fruit were determined daily. The 1-aminocyclopropane-1-carboxylic acid (ACC) content, activities of ACC synthase (ACS), ACC oxidase (ACO), and fruit softening enzymes such as pectin esterase (PE), *endo*-1,4-β-D-glucanase (EGase), *exo*- and *endo*-polygalacturonase (*exo*-PG, *endo*-PG) as well as firmness and rheological properties of pulp were determined at two- and seven-day intervals during ripening and cool storage, respectively. NO fumigation inhibited ethylene biosynthesis and respiration rate, and maintained higher pulp firmness, springiness, cohesiveness, chewiness, adhesiveness, and stiffness. NO-fumigated fruit during cool storage and ripening had lower ACC contents through inhibiting the activities of both ACS and ACO in the fruit pulp. NO-fumigated fruit showed decreased activities of *exo*-PG, *endo*-PG, EGase, but maintained higher PE activity in pulp tissues during ripening and cool storage. In conclusion, NO fumigation inhibited ethylene biosynthesis through inhibition of ACS and ACO activities leading to reduced ACC content in the fruit pulp which consequently, reduced the activities of fruit softening enzymes during ripening and cool storage.