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## Research article

# Transient H<sub>2</sub>O<sub>2</sub> Induction by ClO<sub>2</sub> Fumigation Alters Prx-Trx System and Causes MAPK Accumulation Attenuating Browning in Harvested Longan Fruit

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**Abstract** Peroxiredoxin-thioredoxin (Prx-Trx) system plays a critical role in both redox sensing and controlling of signal transduction pathways. This study aimed to demonstrate the effects of chlorine dioxide (ClO<sub>2</sub>) fumigation on the alteration of redox status of peroxiredoxin (Prx) and thioredoxin (Trx) in hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) sensing and the activation of mitogen-activated protein kinase (MAPK) involved in signal transduction and pericarp browning of longan fruit. After fresh longan fruit were fumigated with 10 mg L<sup>-1</sup> ClO<sub>2</sub> for 10 min, a transient peak of H<sub>2</sub>O<sub>2</sub> was found at 6 h. It also led to strong accumulation of mitogen-activated protein kinases 3 and 6 (MPK3 and MPK6) that persisted up to 3-5 d after fumigation. Furthermore, the oxidation state as well as reductase activities of both Prx and Trx increased concurrently, reaching their peaks at 12-24 h after fumigation. Both redox state and redox potential of nicotinamide adenine dinucleotide phosphate were significantly affected throughout the time of storage (7 d). The altered Prx and Trx redox state and accumulation of MPK3 and MPK6 were closely associated with the reduction in excessive H<sub>2</sub>O<sub>2</sub> accumulation and pericarp browning after 24 h of fumigation. These findings indicated that ClO<sub>2</sub> may trigger the H<sub>2</sub>O<sub>2</sub>-induced Prx/Trx redox cycling and MAPK activity, resulting in the reduction of pericarp browning of longan fruit during storage.

**Keywords:** Chlorine dioxide, *Dimocarpus longan* Lour. , MAPK, Prx-Trx system, Redox potential, Signal transduction

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