

# Exogenous application of hydrogen sulfide and $\gamma$ -aminobutyric acid alleviates chilling injury and preserves quality of persimmon fruit (*Diospyros kaki*, cv. Karaj) during cold storage

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## Abstract

We studied the effectiveness of the exogenous application of hydrogen sulfide (NaHS; 0, 1, 2, 3 and 4 mM) and  $\gamma$ -aminobutyric acid (GABA; 0, 2.5, 5, 7.5 and 10 mM) in alleviating chilling injury and retaining the quality of persimmon fruit during storage at 2 °C for 45 days. Our results showed that the persimmon fruit treated with 3 mM NaHS or 7.5 mM GABA exhibited lower chilling injury manifested by lower peel browning accompanying by higher total soluble solids (TSS) and titratable acidity (TA). Lower H<sub>2</sub>O<sub>2</sub> accumulation along with higher ascorbic acid accumulation in persimmon fruit treated with 3 mM NaHS or 7.5 mM GABA owing to higher activities of superoxide dismutase (SOD), catalase (CAT), and ascorbate peroxidase (APX) enzymes may be accountable for keeping membrane integrity, represented by lower electrolyte leakage and malondialdehyde (MDA) accumulation. Besides, the higher accumulation of phenols and flavonoids owing to the higher phenylalanine ammonia-lyase (PAL) and lower polyphenol oxidase (PPO) activity in persimmon fruit treated with 3 mM NaHS or 7.5 mM GABA may be the explanation for superior DPPH scavenging activity. In addition to the lower chilling injury, persimmon fruit treated with 3 mM NaHS or 7.5 mM GABA exhibited higher firmness owing to lower activities of polygalacturonase (PG) and pectin methylesterase (PME). Hence, our results demonstrate that exogenous application of 3 mM NaHS or 7.5 mM GABA could alleviate chilling injury, thus retaining the quality of persimmon fruit during cold storage.