Nitric oxide improves the effect of 1-methylcyclopropene extending the tomato (*Lycopersicum esculentum* L.) fruit postharvest life

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Abstract

Tomato fruit ripening and postharvest display a complex net of metabolic pathways, which are controlled by different signaling molecules and hormones that coordinate this physiological process. The inhibition of the ethylene action with 1-methylcyclopropene (1-MCP) has proved to be an excellent tool for maintaining fruit quality during postharvest. Along with these findings, nitric oxide (NO) demonstrated different effects on several species in fruit postharvest. The aim of this work was to evaluate the joint effect of 1-MCP and a NO donor (S-nitrosoglutathione, GSNO) during tomato postharvest at 23 °C. Breaker tomatoes were harvested from a local grower and divided in the following treatments: untreated, 1 mM GSNO, 0.5 μL L^{-1} of 1-MCP, and the combination of 1 mM GSNO + 0.5 μL L^{-1} 1-MCP. Fruit was stored at 23 °C and analyzed after 5 and 10 d. According to the results, the combination of 1-MCP and the NO donor delayed fruit softening at days 5 and 10, reduced the ethylene synthesis significantly at day 5 and elevated the respiration rate at 10 d, compared to the individual treatments of 1-MCP and GSNO alone. However, the solely application of 1-MCP, independently from the addition of GSNO, showed a strong effect in the rise of the total titratable acidity content, together with the citric acid content. 1-MCP also up-regulated the CAT, SOD and POD activities at 5 and 10 d after harvest. These findings may suggest that some fruit quality parameters in tomato postharvest are controlled by ethylene, while others need the coordination of nitric oxide as a signal molecule.