

**Title** Effects of TiO<sub>2</sub> photocatalytic oxidation in the room atmosphere and the quality of tomato fruit during storage under a closed system

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### **Abstract**

Fruits that are stored in closed storage rooms during transport often lose their quality rapidly not only by ethylene gas accumulating in the room but also by accelerated fermentation, which is caused by anaerobic conditions. In this study, green-mature tomato fruits were stored in closed chambers, and the effects of photocatalytic oxidation by titanium-dioxide (TiO<sub>2</sub>) on the maintenance of fruit quality and changes in the gas environment in the chambers were investigated. Ethylene and CO<sub>2</sub> concentrations in the untreated chamber (without TiO<sub>2</sub> photocatalyst) increased rapidly during storage, while those in the treatment chamber (with TiO<sub>2</sub> photocatalyst) increased gradually, reaching approximately 30% of the levels of the untreated chamber at the end of storage period. When tomato fruits were stored at 15°C for 17 days, fruit firmness did not differ significantly between the treatments, while green skin colour was maintained only in the treated fruits. Both the citric and malic acid concentrations in the pulps and loculi of treated fruit were significantly higher than those of untreated tomatoes. Conversely, both the acetaldehyde and ethanol concentrations of treated tomatoes were significantly lower than those of untreated fruit. Both the glucose and fructose concentrations in the pulps of treated tomatoes were significantly higher than those of untreated fruit, but those in the loculi of treated fruit were significantly lower than those of untreated tomatoes. Our results show that TiO<sub>2</sub> photocatalytic oxidation is a useful technique not only to reduce ethylene and CO<sub>2</sub> gases in the storage room but also to maintain the fruit quality of green-mature tomato fruits.