

# Exogenous methyl salicylate alleviates senescent spotting by enhancing the activity of antioxidative ascorbate-glutathione cycle in harvested ‘Sucrier’ bananas

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## Abstract

Senescent peel spotting, a physiological disorder, develops during the latter stage of ripening which coincides with the best eating quality of ‘Sucrier’ banana fruit. It is a major constraint for banana growers and traders. The aims of this study were to evaluate the regulatory roles of methyl salicylate (MeSA) on the senescent spotting and the activity of antioxidative ascorbate glutathione (ASA-GSH) cycle in ‘Sucrier’ banana during storage. ‘Sucrier’ bananas (ripening stage 3–4) were immersed in 0 (control) and 2 mM MeSA for 30 min, then air dried and stored at  $25 \pm 1$  °C for 6 d. After treatment, peel spotting, reactive oxygen species (ROS) production (hydrogen peroxide and hydroxyl radical contents), oxidative membrane damage (malondialdehyde and protein carbonyl contents and electrolyte leakage), enzymatic and non-enzymatic components of ASA-GSH cycle were determined. It was shown that the symptoms of peel spotting in the control group was observed on day 2 and the severity increased continuously throughout storage. The occurrence of peel spotting coincided with the marked increase in the ROS production and oxidative membrane damage. The activities of ASA-GSH cycle including ascorbate peroxidase, dehydroascorbate reductase, monodehydroascorbate reductase and glutathione reductase activities as well as ascorbate (ASA) and reduced glutathione (GSH) contents declined with an increase in the severity of peel spotting. However, MeSA treatment caused an overall increase in the activities of enzymatic and non-enzymatic antioxidants as well as ASA/dehydroascorbate and GSH/oxidized glutathione ratios for up to 5–6 d of storage. The increased activity of ASA-GSH cycle was also associated with the decreases in ROS levels, oxidative membrane damage and senescent spotting development, indicating that MeSA treatment could reduce senescent spotting of ‘Sucrier’ bananas during storage by enhancing the activity of ASA-GSH cycle leading to the induction of antioxidant defense system to overcome ROS production, oxidative damage and fruit senescence.