

Title Effect of the fruit-to-volume ratio on the efficacy of 1-methyl-cyclopropene application in papaya

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Abstract

Affecting factors on the efficacy of 1-MCP had been studied, nevertheless, there is no information describing whether the chamber loading affects the 1-MCP effectiveness when treating papaya. The purpose of this study was to evaluate the effect of the fruit-to-volume ratio of the treatment chamber on the ripening of papayas treated with 1-methylcyclopropene (1-MCP). Papayas were harvested at ripening stages of 1 (up to 15% of skin yellow surface) and 2 (from 16 to 25% of skin yellow surface) and placed in different chambers with varying quantities of fruit per chamber. Treatments consisted of chambers loaded with 30, 60 or 120 cardboard boxes containing 12 papayas each (approximately 3.8 kg) corresponding to 18.75, 37.5 and 75% of the fruit-to-volume ratio, respectively. A quantity of 300 mg of SmartFresh™ was used at a concentration of 100 nl/L to generate 1-MCP gas per 1.868 m³ chamber for all treatments. Non-treated fruit was used as a control. The fruit was stored at 22°C for 10 days after 1-MCP treatment. When the fruit-to-volume ratio of the treatment chamber was at 75% the treatment did not delay changes in fruit firmness, respiratory activity or rotting. Otherwise fruit treated in the chambers with 18.75 or 37.5% fruit-to-volume ratio were not soft enough for consumption after 10 days of storage. The results suggest that increased box number leads to faster depletion of 1-MCP in the chamber. Thus, the results support the hypothesis that the fruit-to-volume ratio inside the chamber influences the efficacy of 1-MCP in the papaya fruit. Therefore, lower amounts of fruit and packing cardboard boxes in the treatment chamber are related to greater effects of 1-MCP.