Title Timing of 1-methycyclopropene exposure in relation to ethylene application influences shelf life of Cavendish bananas

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Abstract

We examined the respone of shelf life and fruit quality of banana (cv. Williams) from the middle of the bunch to the application of 1-MCP and ethylene simultaneously as well as the effect of pre- and early-climacteric application of 1-MCP (multiple applications) treatment of bananas harvested from the top or bottom of bunches. Fruit were treated with ethylene at 100 µL L-1 for two consecutive days as a control or simultaneously with 1-MCP at different concentrations (30, 100 or 300 nL L-1) on the first day or second day, or treated with 1-MCP alone on the third day. To examine the effect of low concentration of 1-MCP in the pre-climacteric stage fruit were treated with 1-MCP at (0, 2, 4, 5, 6 or 10 nL L-1) for 6 h at 22 ºC and followed by ethylene at 100 µL L-1 for two consecutive days (control) or ethylene followed by early-climacteric 1-MCP application at 300 nL L-1. Shelf life increased significantly compared to the control when 1-MCP was applied coincidently with ethylene in the second day and reapplied alone in the third day or applied only in the third day. Application of 1-MCP at the lower concentrations at the pre-climactic stage in combination with reapplication of 1-MCP in the early-climacteric stage increased shelf life significantly in both fruit from the top and bottom of the bunch. Higher concentrations of applied 1-MCP in both experiments sometimes caused fruit ripening not to occur, in other treatments 1-MCP had no negative impact on shelf life and quality parameters such as firmness, discoloration index, weight loss, total soluble solids. These observation suggest that the efficacy of 1-MCP to improve shelf life and quality of bananas is reliant on not only the concentration of applied 1-MCP but also the timing of 1-MCP application in relation to ethylene application. We conclude that simultaneous application of 1-MCP is more affective than the more common method of extending banana shelf life through of 1-MCP after ethylene treatment.