

Title Concentration and duration of ethylene treatment influences the response of banana to 1-methylcyclopropene

Authors F. Moradinezhad, A.J. Able, M. Sedgley and A. Klieber

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### Abstract

We examined the effect of ethylene concentration and duration on 1-MCP efficacy with regards to shelf life and fruit quality in bananas (cv. Williams) from the middle section of bunches harvested during winter 2004 and summer 2005. Before storage, fruit was treated with ethylene (2, 20, 50 or 100  $\mu\text{L}\cdot\text{L}^{-1}$ ) for two consecutive days or 100  $\mu\text{L}\cdot\text{L}^{-1}$  for the first and 2  $\mu\text{L}\cdot\text{L}^{-1}$  for the second day, prior to 1-MCP (300  $\text{nL}\cdot\text{L}^{-1}$ ) exposure for 24 hrs at 22°C. To examine the effect of duration, bananas were treated with 100  $\mu\text{L}\cdot\text{L}^{-1}$  ethylene for 30, 40 or 50 hrs prior to 1-MCP treatment (300  $\text{nL}\cdot\text{L}^{-1}$ ) at 22 °C. 1-MCP was most effective at increasing shelf life and firmness when fruit were treated with 100  $\mu\text{L}\cdot\text{L}^{-1}$  ethylene for the first day and 2  $\mu\text{L}\cdot\text{L}^{-1}$  for the second day. Interestingly, fruit harvested in winter initially treated with ethylene at the lowest concentration (2  $\mu\text{L}\cdot\text{L}^{-1}$ ) or exposed to the shorter duration of ethylene (30 hrs) did not ripen and remained green when treated with 1- MCP. However, winter-harvested bananas that were exposed to ethylene for 50 hrs had a longer shelf life compared to bananas treated with ethylene for 40 hrs. 1-MCP was only more effective in summer-harvested fruit when they were exposed to ethylene for 40 hrs with an increase in firmness. The discolouration index (DI) of 1- MCP treated fruit increased significantly when fruit were exposed to the ethylene for shorter durations than 50 hrs in winter, but no differences were observed in DI of 1-MCP treated bananas that were ripened with ethylene at different concentrations. These observations suggest that the efficacy of 1-MCP to improve shelf life and quality of bananas is reliant on not only the harvest season of fruit but also the concentration and duration of ethylene application prior to 1-MCP usage.