

Title Factors influencing the efficacy of commercially applied 1-MCP

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Abstract

1-MCP, a powerful ethylene inhibitor, is applied commercially to many deciduous crops to extend storage duration and improve shelf-life quality. 1-MCP retards ripening by blocking ethylene receptor sites and reducing the action of ethylene. The importance of harvest maturity, and delays in commercial 1-MCP applications after harvest, can be observed in fruit quality following cold storage and shelf life. Pack houses are continually looking to improve treatment efficacy and to have advanced knowledge of the benefits that they can expect after storage. This study was initiated to improve 1-MCP application recommendations and to improve guidelines for 1-MCP usage. Golden Delicious and Granny Smith apples were harvested weekly from the beginning of the optimum picking window, until fruit were of a post optimum maturity. Fruit subjected to commercial rates of 1-MCP, 1, 4, 7 and 14 days after harvest were cold stored with untreated fruit for 16 weeks at -0.5°C, followed by a shelf life of 7 days at 20°C. Immediately after each 1-MCP application, treated fruit were subjected to a 7 day ripening period at 20°C to determine the efficacy of the application. The importance of applying 1-MCP to Golden Delicious apples as soon as possible after harvest was confirmed, and indicated storage and shelf life benefits if fruit are treated within 7 days of harvest. 1-MCP applied 14 days after harvest did not show any storage or shelf life benefits. Fruit not treated with 1-MCP were all below the UK supermarket grade of 5.8 kg after 16 weeks cold storage, regardless of harvest. All fruit, treated with 1-MCP within 7 days of harvest, made the UK supermarket grade. 1-MCP applied to Granny Smith apples up to 14 days after harvest maintained flesh firmness over the entire harvesting period, with all fruit making the supermarket grade of 6.8 kg after cold storage. However, superficial scald control was compromised when 1-MCP was applied more than 7 days after harvest. 1-MCP treated Granny Smith apples did not exhibit flesh firmness loss during shelf life. Internal ethylene levels of 1-MCP treated fruit were an accurate indicator of treatment efficacy, storage potential, and the physiological ripening responses of Golden Delicious and Granny Smith apples following storage and shelf life. The significance of these findings will be discussed, in terms of practical guidelines to 1-MCP application to Golden Delicious and Granny Smith apples.