

Title Short treatment with ethylene and 1-methylcyclopropene in combination prior to storage is sufficient to reduce sprout growth in onion (*Allium cepa* L.)

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Abstract

To eliminate the use of chemical sprout suppressants such as maleic hydrazide, onions intended for long term storage in the UK are held in continuous ethylene ($10 \mu\text{l L}^{-1}$). That said, short treatments for 24 h with ethylene or the ethylene binding site inhibitor, 1-methylcyclopropene, have both been found to reduce sprout growth compared with onions stored in air. The aim of this study was to investigate whether the application of ethylene ($10 \mu\text{l L}^{-1}$) and 1-MCP ($1 \mu\text{l L}^{-1}$) in combination for 24 h before or after curing would suppress sprout growth of 'Sherpa' onions following long term storage at 1°C in 2008-2009 and at 1 or 6°C in 2009-2010. In both years, treatment with ethylene and 1-MCP before curing resulted in an increase in respiration rate whereas the same treatment applied after curing resulted in no significant change in respiration rate. In 2008-2009 and 2009-2010, onions treated with ethylene and 1-MCP in combination after curing had significantly shorter sprouts 25 and 19 weeks after harvest, respectively, compared with the control bulbs. Previously, studies have shown that ethylene and 1-MCP applied individually before curing were more successful at reducing sprout growth compared with application after curing possibly due to the a change in the skin composition following curing. Yet, results herein suggest that when used in combination, application after curing resulted in significantly shorter sprout growth compared with the control bulbs and those treated with both ethylene and 1-MCP before curing. It is possible that when applied in combination, lower concentrations of each treatment are more successful at reducing onion sprout growth hence when treated after curing the difference in skin composition may provide a greater barrier allowing a lower influx of ethylene and 1-MCP and therefore resulting in no increase in respiration rate compared with the control. In conclusion, providing 1-MCP is approved for use on onions, the application of ethylene and 1-MCP in combination to onions post-curing could provide a safer and cheaper alternative to current onion sprouting suppressants.