

**Title** Postharvest application of ethylene and 1-methylcyclopropene either before or after curing affects onion (*Allium cepa* L.) bulb quality during long term cold storage

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### Abstract

The storability of onion bulbs is dependent on the incidence and rate of sprout growth. Exogenous ethylene applied continuously has been demonstrated to act as a sprout suppressant in onion. However, the ethylene binding inhibitor, 1-methylcyclopropene (1-MCP), can also suppress sprouting in onion. Given this seemingly contradictory result, the precise role that ethylene plays during onion storage and the effect of curing on its efficacy is not understood.

'Sherpa' and 'Wellington' onion bulbs were treated before or after curing (28 °C for 6 weeks) with a single dose of 10  $\mu\text{L L}^{-1}$  ethylene or 1  $\mu\text{L L}^{-1}$  1-MCP for 24 h at 20 °C, or no treatment (control). Replicated out-turns were sampled during 38 weeks storage at 0–1 °C. Sprout growth (31 weeks after harvest) was reduced in 'Sherpa' treated before curing with ethylene or before or after curing with 1-MCP. However, sprout growth of 'Wellington' was not affected by any treatment. Following treatment, the cured, thick-skinned 'Wellington' released a lower concentration of treatment gas compared with the newly harvested, thin-skinned 'Sherpa'. Onion bulb respiration rate increased immediately after being treated with ethylene but to a lesser extent or not at all when treated with 1-MCP. Fructose concentrations of onions treated with ethylene or 1-MCP before curing were not significantly different, however, after curing concentrations were about 2-fold higher compared with the control. Mean glucose and sucrose concentrations for both cultivars were higher immediately after being treated before curing with ethylene or 1-MCP than control bulbs. It appears that inhibition of sprout growth can be achieved using just a short 24 h treatment with ethylene or 1-MCP. However, skin thickness or permeability, which is dependent on cultivar and curing, may affect ethylene or 1-MCP influx and therefore efficacy of sprout suppressant action.