RESPONSE OF APPLES TO HIGH-TEMPERATURE CONTROLLED ATMOSPHERE DISINFESTATION TREATMENTS

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With the anticipated loss of methyl bromide for use as a fumigant and the worldwide trend away from chemical usage, there is an urgent need to develop alternative non-chemical disinfestation treatments for horticultural produce. Such treatments must control the quarantine pest of concern without detrimentally affecting the quality of the commodity.

We have examined controlled atmospheres at elevated temperatures as an alternative disinfestation treatment for apples. The response of 'Royal Gala' and 'Granny Smith' apples (*Malus domestica* Borkh.) to high-temperature controlled atmosphere treatments for control of lightbrown apple moth (*Epiphyas postvittana* Walker) and wheatbug (*Nysius huttoni* White) was investigated. Mean LT_{99} values for fifth instar lightbrown apple moth and adult wheatbug inoculated onto apples and exposed to 1.2% O_2, 1% CO_2 (CA) at 40°C, were 14.2 ± 0.1 h and 16.6 ± 0.1 h respectively. Apples were therefore subjected to 40°C for 17 or 20 h in CA (treatments identified as giving 100% mortality of lightbrown apple moth and wheatbug respectively), or in air. Following treatment, fruit were cooled in ambient water or air, stored at 0.5°C in air for eight weeks, then held at 20°C for seven days before being assessed for quality. No significant damage was observed with 'Royal Gala' apples with CA or air treatments at 40°C, relative to non-treated controls. With 'Granny Smith', the 17 and 20 h CA and the 20 h air treatments showed slight damage in the form of internal browning. Hydrocooling tended to reduce fruit damage relative to fruit cooled in ambient air. CA-treated 'Royal Gala' and 'Granny Smith' fruit were firmer than those treated in air which in turn were firmer than non-treated control fruit.

Results suggest that high temperature CA treatment shows potential as a non-chemical disinfestation treatment against lightbrown apple moth and wheatbug on 'Royal Gala' apples. 'Granny Smith' apples appear to be more sensitive to the heat-based disinfestation treatment tested here.