

Title Postharvest treatment to control codling moth in fresh apples using water assisted radio frequency heating

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### Abstract

Apples destined for export to Japan and South Korea are currently disinfested for codling moth, *Cydia pomonella* L. (Lepidoptera: Tortricidae), using methyl bromide fumigation. Restrictions and limitations imposed on the uses of methyl bromide have increased interest in developing alternative non-chemical quarantine treatments. It is imperative that the treatment is effective against codling moth yet maintains the quality of treated apples. The present study explored the application of radio frequency (RF) energy in conjunction with conventional hot water treatment to develop feasible heat treatments. Treatment parameters were selected based on minimum time–temperature conditions required for 100% mortality of fifth-instar codling moth and apple quality. The treatments included preheating of infested or wholesome apples in warm water at 45 °C for 30 min. The preheated apples were then heated to 48 °C in a hydraulic fruit mover placed between two parallel plate electrodes in a 12 kW, 27.12 MHz pilot scale RF system. RF treated apples were transferred to a 48 °C hot water bath and held for 5, 10, 15 and 20 min before being hydro-cooled in ice water for 30 min. The mortality of codling moths in the infested apples was assessed, and the quality of wholesome apples was evaluated by measuring weight loss, firmness, color, soluble solids content, and titratable acidity after 0, 7, and 30 days of storage at 4 °C. The results showed that the treatment at 48 °C for 15 min was the most practical and effective both for insect control and apple quality.