

Title Treatment protocols to control codling moth in apples using radio frequency energy
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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 has become imperative to develop a practical treatment that is effective against codling moth and 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 a feasible heat treatment. The treatments were designed considering minimum time required for 100% mortality of fifth-instar codling moth and post harvest quality assessment. A 27.12 MHz and 12 kW pilot scale RF system, equipped with a fruit mover, was used to raise the temperature of 45°C pre-heated apples to 48°C. After RF heating in tap water, apples were transferred to a 48°C hot water bath and held for 10, 15 and 20 min before being hydrocooled in ice water for 30 min. Post harvest quality was assessed 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 10 min was the most practical and effective both for insect control and apple quality. If this heating method could be scaled-up and economically integrated into current apple packaging lines, it would be a potential alternative to methyl bromide fumigation for disinfesting apples.