

**Title** Developing postharvest disinfestation treatments for legumes using radio frequency energy  
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### **Abstract**

There is an urgent need to develop technically effective and environmentally sound phytosanitary and quarantine treatments for the legume industry to replace chemical fumigation. The goal of this study was to develop practical non-chemical treatments for postharvest disinfestations of legumes using radio frequency (RF) energy. A pilot-scale 27 MHz, 6 kW RF unit was used to investigate RF heating and consequent quality attributes in treated chickpea, green pea, and lentil samples. Only 5–7 min were needed to raise the central temperature of 3 kg legume samples to 60 °C using RF energy, compared to more than 275 min when using forced hot air at 60 °C. RF heating uniformity in legume samples was improved by adding forced hot air, and back and forth movements on the conveyor at 0.56 m min<sup>-1</sup>. The final temperatures exceeded 55.8 °C in the interior of the sample container and 57.3 °C on the surface for all three legumes, resulting in low uniformity index values of 0.014–0.016 (ratio of standard deviation to the average temperature rise) for the interior temperature distributions and 0.061–0.078 for surface temperature distributions. RF treatments combined with forced hot air at 60 °C to maintain the target treatment temperature for 10 min followed by forced room air cooling through a 1 cm product layer provided good product quality. No significant differences in weight loss, moisture content, colour or germination were observed between RF treatments and unheated controls.