

**Title** Dielectric heating as a potential post-harvest treatment of disinfesting mangoes, Part II: Development of RF-based protocols and quality evaluation of treated fruits

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### **Abstract**

With knowledge of frequency and storage dependent dielectric properties of mangoes, we studied a possible treatment that used radio frequency (RF) heating to reduce thermal treatment times in post-harvest pest control of immature mangoes. In this study, surface heating by hot water (HW) was combined with RF core heating of fruit against Mexican fruit fly (*Anastrepha ludens*) in mangoes (*Mangifera indica* cv. Tommy Atkins). Mangoes were first heated in water at 45 °C for 50 min followed by RF heating in a 27.12 MHz, 12 kW RF system for 1 min to reach 48 °C over the whole volume of the fruit. Fruit was then held in water at 48 °C for 4, 6 or 8 min, which corresponded to one level at, one above and another below the time needed to achieve 100% killing of third-instar larvae of *Anastrepha ludens* at this temperature. The controls were treated in HW at 46.1 °C for 90 min, which is a commercial disinfestation treatment approved by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS) for mangoes before shipping to the USA. After 12 days of storage at 21 °C and 90% relative humidity, RF-treated mangoes were firmer than those treated at 46.1 °C in HW ( $p < 0.05$ ). Thus, the RF treatment improved the texture of the fruits compared with the currently used commercial HW treatment. RF treatments that brought fruit temperature to 48 °C followed by 6 or 8 min holding at this temperature should achieve the required disinfestation of mangoes without causing quality losses.