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Improving of Thermal Uniformity of Mango During Radio Frequency Heat Treatment for Insect Control

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Abstract

Hypothesis in this study was to improve the distribution of electromagnetic energy from radio frequency (RF) heating of mango fruit (*Mangifera indica* L.). Therefore, a rotating container was developed and filled with a medium (water) to support a homogeneous movement and uniformity of electromagnetic energy. The experiment was to compare the uniformity of heat inside mango fruit treated by several thermal methods based on U.S (USDA-APHIS-PPQ, 2002) regulation for control fruit fly in mango. Design of rotating container combined with RF applicator was done. The indicator affected on movement of mango fruit then was investigated by using three different weights (360, 330 and 250g) of mango (*Mangifera indica* L.) to determine the flow rate as well as the velocity of the movement of fruit around the container per time was also measured. Comparison of heating method between radio frequency, hot water and hot air on mango fruit were evaluated by infrared camera for the uniformity of heat in treated mango fruit. The result was found that 1000 watt RF heating energy applied to container of fruit-roll could provide a consistent distribution of thermal treatment in mango with exposure period for 5–10 minutes which was equivalent to the result from dipping in hot water for a period of 40 minutes. Besides that the thermal distribution in mango treated with hot air showed non-uniform heat distribution inside flesh fruit. Moreover, the RF heating operation process required shorter time than immersion into hot water and exposure to hot air. The results recorded also that there were no contact damages observed since the mango fruit moved freely in water filled chambers.

Keywords: Heat uniformity, mango, radio frequency, rotating container