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# Radio Waves May Offer A New, Environmentally Safe Pest Control Method

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In today's global marketplace, agricultural exports carry the risk of introducing exotic insect pests into new environments, causing major economic losses. Effective pest control methods, such as methyl bromide, unfortunately come with toxic gases and chemicals. New research using radio frequency (RF) treatments as an environmentally-friendly pest control method may provide a new alternative. >>

To reduce the risk of introducing pests, importing countries or regions impose quarantine for the hosts of targeted pests. This can present major economic implications considering the value of world agricultural exports increased from \$442 billion to \$604 billion between 2002 and 2004, making the international trade of agricultural commodities an integral part of the global economy.

Drs. Juming Tang and Shaojin Wang at Washington State University (WSU) with colleagues at the University

of California-Davis and USDA's Agricultural Research Service in Parlier, CA, developed a way to harness electromagnetic energy at RF to eliminate the targeted insect pests.

Thirty percent of U.S. in-shell walnuts are exported to Asia and Europe, where they are subject to quarantine. RF heating characteristics were applied first to walnuts, due to the heat sensitivity of this low-moisture commodity. Using a WSU heating block system, thermal death kinetic models were developed

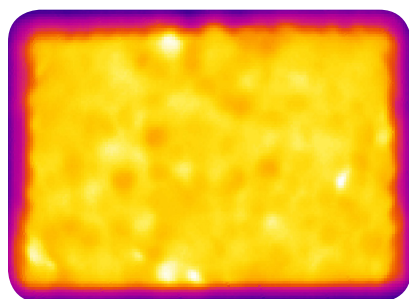
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Right: Image of industrial-scale RF system used in the study.

Credit: Photograph by Monzon Wang

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Above (top): Image of infested walnut.

Above (bottom): An infrared thermal (IR) image of walnuts in a plastic container after RF treatment.

Credit: Photographs by Monzon Wang

for targeted insects, including codling moth (*Cydia pomonella*), Indianmeal moth (*Plodia interpunctella*), red flour beetle (*Tribolium castaneum*) and navel orangeworm (*Amyelois transitella*).

RF energy generates heat through agitation of bound water molecules in dry agricultural commodities, such as walnuts. This process also generates heat through ionic conduction and agitation of free water molecules in insects. As a result, more thermal energy is converted in insects than in walnuts, which may provide pest control in low-moisture commodities.

RF treatments effectively control insect pests at life stages present in in-shell walnuts without negatively affecting walnut quality or storability. This process is technically feasible for large-scale commercial applications. RF treatments may serve as a non-chemical alternative to chemical fumigants for post-harvest pest control in similar commodities (such as almonds, pecans, pistachios, lentils, peas, and soybeans), reducing the long-term impact on the environment, human health and competitiveness of agricultural industries.

The research results were published in two papers in the latest issue of

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*Postharvest Biology and Technology* and presented in the new book entitled, *Heat Treatments for Postharvest Pest Control: Theory and Practice*.

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*Heat Treatments for Postharvest Pest Control: Theory and Practice*. 2007. Ed. Juming Tang, Elizabeth Mitcham, Shaojin Wang and, Susan Lurie. Cambridge: CABI.