



Tropentag, October 9-11, 2007, Witzenhausen

“Utilisation of diversity in land use systems:
Sustainable and organic approaches to meet human needs”

Radio Frequency Heat Treatment: An Alternative Phytosanitary Processing Method for the Control of *Sitophilus oryzae* in Milled Rice

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Abstract

Sitophilus oryzae (L.) (Rice weevil) infestation of milled rice during storage is one of the biggest problems leading to huge losses of rice worldwide. The weevils destroy the whole kernel. Contaminated rice usually loses flavour and palatability. This study was set up to determine the efficacy of radio frequency (RF) heat treatment as an alternative to conventional chemical fumigation and to establish the lethal doses of RF heat treatment which can be used in controlling *S. oryzae* in milled rice. Milled rice cv. “Khao Dok Mali 105” (KDML105) with 12% moisture content, infested with *S. oryzae* were heat-treated with RF at 27.12 MHz with a power input of 30% of the maximal output power of 2800 W. Target temperatures were 45, 47.5, 50, 52.5 and 55°C for 1 minute. A further experiment was carried out using a temperature of 50°C for 0, 1, 3, 5, 10, 15 and 30 minutes. Results showed that using RF at 50°C and higher could effectively be used to control *S. oryzae*.

The Rice weevil was completely eliminated at 50°C using durations of either 15 or 30 minutes. The weevil was also eliminated at 52.5 and 55°C using one minute treatment duration. Therefore, the use of RF heat treatment is effective in controlling *S. oryzae* using a target temperature between 50 and 55°C. Further studies will be carried out to investigate the effect of temperature and duration of treatment on survival of *S. oryzae* eggs, larvae and pupae in milled rice during storage. It will be important as well to establish the effect of RF treatment on rice grain quality.

Keywords: Heat treatment, milled rice, phytosanitary, radio frequency, *Sitophilus oryzae*