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Controlling *Oryzaephilus surinamensis* in Wheat with the Use of Microwave Energy

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Abstract

This research was conducted to contribute to the development of pest control by using microwave (MW) energy. A MW applicator at a frequency of 2.45 GHz was used to treat 240 g of wheat. The power input was fixed at 300 Watt. The wheat was evaluated at moisture content of 10 %, 14 %, and 18 %. The temperatures of sample surface were investigated at 45, 50, and 55°C for a 5 minute time exposure. Each treatment was run for 3 replications and about 20 adult *Oryzaephilus surinamensis* were infested in the sample.

As the insects possess small size (3 mm) and high mobility, the insects were packed in a wrapping plastic with 6 to 7 g of wheat. This procedure was applied since there was no significant difference on the surface temperature between the packed and unpacked wheat. The number of insect mortality was counted twice, thus immediately as well as 24 h after treatment.

It was found that the temperatures and moisture contents significantly influence insect mortality ($p < 0.001$). At 45°C, the mortality increased significantly from 6.7 to 93 % when the moisture content was increased from 10 to 14 %. Nevertheless there was no significant difference in mortality at a moisture content of 14 and 18 %. When the temperature treatment was 50°C the mortality increased as the moisture content increased, but there was no significant difference of mortality among all moisture contents evaluated. At 55°C, a mortality of 100 % was found at all moisture contents. When the initial moisture content of wheat was 14 % and 18 %, the loss of moisture content was found within the range of 1.2 % to 3.6 %, so the treatment under these conditions could be used for the drying process.

MW energy can be used to control *Oryzaephilus surinamensis*, but a further experiment at a different time exposure is needed in order to increase the effectiveness of the method. It is also recommended to determine the effect of MW treatment on wheat quality.

Keywords: Microwaves energy, mortality, *Oryzaephilus surinamensis*, sawtoothed grain beetle