

Radio Frequency Heat Treatment for Controlling Rice Weevil in Rough Rice cv. Khao Dawk Mali 105

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ABSTRACT

*The rice weevil (*Sitophilus oryzae* Linnaeus) is one of the most serious stored-grain pests worldwide. The immature insects grow rapidly within grain. This study analyzed the effectiveness of radio frequency (RF) heat treatment for killing rice weevils in rough rice cv. Khao Dawk Mali 105. Rough rice at 14% moisture content was blended with 30 individuals of each stage (egg, larva, pupa, adult) of the rice weevil, and exposed to RF heat treatment at 50°C for 180 seconds. The mortality rates of egg, larva, pupa and adult were 100.00, 96.50 ± 2.3, 80.90 ± 7.3 and 79.69 ± 5.1%, respectively ($P > 0.05$). To then determine the most efficient combination of temperature and duration for RF heat treatment, the adults (representative of the most RF heat-tolerant stages) were treated with 50, 55, 60, 65 and 70°C for 90, 120, 150 and 180 seconds (20 combinations of treatment). RF heat treatment at 55°C for 180 seconds, 60°C for 150 seconds or more, and 65 and 70°C for 120 seconds or more all caused 100% mortality. Of these, the RF treatment of 65°C for 120 seconds used the least energy (0.391 kW).*

Keywords: *Sitophilus oryzae*, Tolerance, Temperature, Radio frequency heat treatment

INTRODUCTION

In Thailand, rice is a major grain crop, with 55% of production consumed domestically and the remainder exported; Khao Dawk Mali 105, or jasmine rice, is important for both (Business Process Analysis Guide to Simplify Trade Procedures, 2011; Phare Rice Seed Center, 2011). Khao Dawk Mali 105 is the most popular aromatic rice variety in Thailand, due to its good cooking quality and aroma (Sareepuang et al., 2008).