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Using Radio Frequency to Control Red Flour Beetle (Coleoptera: Tenebrionidae) in Feed

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Abstract

Radio frequency (RF) was used to control red flour beetle, *Tribolium castaneum* (Herbst), which is an important pest in feed primarily on damaged grain, broken grain, and other cereal products including chicken feed pellets. In experiment I, a sample of 1 kg each out of 5 bags of chicken feed pellet were investigated. All stages of *T. castaneum* were found. Larval stage was the most abundant with 43.2±63.1 insects kg-*1*, followed by egg, adult and pupal stages with 17.60±29.5, 8.40±11.0 and 5.80±8.1 insects kg^{-1}, respectively. In a second experiment, egg, larval, pupal and adult stages of *T. castaneum* were blended with chicken feed pellet and then exposed to RF with 27.12 MHz at 50°C for 3 minutes. Insect mortalities of egg, larval, pupal and adult stages were 81.98±3.8, 92.06±4.0, 72.99±3.3 and 91.58±1.7 %, respectively. The result showed that pupal stage was the most tolerant stage to RF-heat treatments. In experiment III, *T. castaneum* pupae blended with chicken feed pellets were exposed to combinations of RF: 4 different temperatures (50, 55, 60 and 70°C) and exposure for 1, 2, 3, 4 or 5 min (20 combination experiment). The results showed that pupae completely died at 70°C already at the shortest time period of 1 min. Although the RF treatment at 60°C could not get completely control of *T. castaneum* pupae, the mortality rate of pupae between 60 and 70°C were not significant different. Feed analysis showed that the quality of the chicken feed was not affected by the RF treatments.

Keywords: Chicken feed pellet, chicken feed quality, radio frequency, red flour beetle, *Tribolium castaneum*

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