

ABSTRACT

Postharvest insect pests such as *Sitophilus oryzae*, *Tribolium castaneum*, and *Oryzaephilus surinamensis* are the major causes of rice deterioration during storage, resulting in reduced grain quality and quantity. Continuous use of synthetic insecticides may lead to insect resistance, hazardous residues, and environmental pollution. Therefore, safer alternative control methods are needed through the utilization of botanical insecticides. This study aims to evaluate the bioactivity of kaffir lime (*Citrus hystrix*) leaf extract as a repellent and insecticide against adults of *S. oryzae*, *T. castaneum*, and *O. surinamensis*. The experiment was conducted at the Plant Pest and Disease Laboratory, Faculty of Agriculture, Malikussaleh University, from March to May 2026 using a Completely Randomized Design (CRD) with six treatments: control, 0.5%, 1%, 2%, 4%, and 8% (w/v), each replicated three times. The observed parameters included repellency percentage, adult mortality, and LC_{50} values determined using probit regression analysis. Data were analyzed using analysis of variance (ANOVA), followed by Duncan's Multiple Range Test (DMRT) at the 5% significance level. The results showed that kaffir lime leaf extract had significant to highly significant effects on both repellency and mortality of the three insect pest species. Increasing the extract concentration resulted in higher repellency and mortality percentages. The 8% concentration was the most effective treatment in enhancing both repellent activity and toxicity against *S. oryzae*, *T. castaneum*, and *O. surinamensis*. Probit analysis indicated that each insect species exhibited different levels of susceptibility to the kaffir lime leaf extract. Therefore, kaffir lime leaf extract has strong potential to be developed as an effective and environmentally friendly botanical insecticide for the control of postharvest insect pests.

Keywords: botanical insecticide, *Citrus hystrix*, mortality, postharvest insect pests, repellency.