Title	Influence of grain and relative humidity on the mortality of *Sitophilus oryzae* (L.) adults exposed to ethyl formate vapour
Author	K.A. Damcevski and P.C. Annis
Citation	Journal of Stored Products Research Volume 42, Issue 1, 2006, Pages 61-74
Keyword	Grain fumigant; Ethyl formate; *Sitophilus oryzae*; Rapid disinfestation; Wheat; Relative humidity

Abstract

Ethyl formate (EF) is being investigated as an alternative to phosphine and methyl bromide, for the fumigation of stored products. The compound has been found to have a rapid action against stored-product insects and shows promise as a fast-acting disinfestant.

The response of *Sitophilus oryzae* adults to EF in a sealed system was studied. Insects were exposed to a range of EF doses for 24 h at 25 °C, with a range of grain quantities and relative humidities (r.h.). It was found that rapid mortality of *S. oryzae* adults in a sealed system was obtained, with a range of applied concentrations required to achieve 99% mortality. Concentrations as low as 11.2 mg L^{-1}, for the exposures without wheat at 97% r.h., achieved 99% mortality, whereas 81.2 mg L^{-1} EF was required for the exposures carried out on 1500 g wheat in 2.7 L at 60% r.h. Modelling studies of the mortality data revealed that, in general, the presence or absence of grain had the largest influence on mortality, where the larger the grain quantity, the higher the required EF dose to achieve 99% mortality. To a lesser degree, the r.h. also influenced the observed mortality, where the higher the r.h., the lower the required EF dose to achieve 99% mortality. In this experimental system, the factors that determined the level of mortality were a complex interaction of the initial dosage concentration (C_0), concentration×time product (Ct), grain quantity and r.h.