

Effects of extreme temperatures on the survival of the quarantine stored-product pest, *Trogoderma granarium* (Khapra beetle)

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Abstract

The khapra beetle, *Trogoderma granarium* (Coleoptera: Dermestidae) is a pest of stored grain in Africa and Asia. It is a quarantine insect for much of the rest of the world, and it is often intercepted in USA and Canada in food imports (Eliopoulos, 2013). Khapra beetle can be controlled with methyl bromide, but this fumigant is an ozone-depleting substance. Thus, there is an urgent need to find new methods of control, such as extreme temperatures (Fields et al. 2012). To assess the duration necessary to control khapra beetle at high and subzero temperatures, different life stages were exposed to -10 and 45°C for 7 d. An exposure of 7 days at 45°C controlled all life stages of khapra beetle and 20 d control all non-larval stages at -10°C. After 7 days at -10°C unacclimated larvae had 45, 25, 0 and 0% mortality for unacclimated larvae, diapausing larvae, cold-acclimated larvae, and diapausing-cold-acclimated larvae respectively (n= 20). SCP of eggs was the lowest at $-26.2 \pm 0.1^\circ\text{C}$, unacclimated larvae the highest at $-14.5 \pm 0.4^\circ\text{C}$ and diapausing acclimated larvae had a SCP of $-22.7 \pm 0.4^\circ\text{C}$.

Keywords: stored-product insects, heat, cold, super-cooling point

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References

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