SUSCEPTIBILITY OF KHAPRA BEETLE TO CONTACT INSECTICIDES AND INSECT GROWTH REGULATORS

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The khapra beetle, *Trogoderma granarium* (Everts), is a stored product pest that triggers quarantine actions in many countries, including the USA. This is a very destructive insect pest that can feed on a variety of food sources, including raw grains. Larvae can often diapause for years when food is scarce. With increasing international commerce, there are concerns regarding the khapra beetle, and what could be done to prevent this pest from becoming established in the USA.

Currently in the US the only approved insecticide treatments to control khapra beetle are malathion and permethrin. Reports of insecticide resistance to mathathion in most stored-product insects highlight the need for new approved treatments. There are a number of newer reduced-risk insecticides that can currently be used as residual surface treatments inside structures such as food warehouses, mills, and sites where finished food products are stored and eventually distributed to retail outlets. The purpose of these studies were to evaluate susceptibility of khapra beetle to some of these newer insecticides.

Earlier studies evaluated susceptibility of khapra beetle and other dermestid species, and although there was some variability between species and insecticides results show that both the warehouse beetle *Trogoderma variabile* (Ballion) and the larger cabinet beetle *T. inclusum* (LeConte) could be used a surrogate or substitute species to assess susceptibility of the khapra beetle. In much of the world, khapra beetle can only be reared under strict quarantine conditions inside secure facilities, in the USA this is done at the USDA-APHIS-CPHST in Buzzards Bay, MA, on the grounds of Otis AFB.

The pyrethroids cyfluthrin and deltamethrin, and the insecticidal pyrolle chorfenapyr, both gave residual control of adult khapra beetle when used at the label rates. Larvae were much more tolerant to these insecticides compared to adults, and longer exposure times were needed to either kill larvae outright or prevent eventual emergence to the adult stage. The insect growth regulators pyriproxyfen and methoprene also gave control, but again long exposure times were necessary for complete suppression of adult emergence of exposed larvae. However, the IGRs did offer residual control.

Results show that several newer insecticides can replace malathion in control recommendations, especially for adults that are short-lived compared to longer-lived adults of other stored product beetles. However, results indicate that khapra beetle larvae may be more difficult to kill than larvae of other common stored product beetles, and further research is needed to assess larval susceptibility to contact insecticides and IGRs.