

Title Factors affecting the insecticidal efficacy of the diatomaceous earth formulation SilicoSec against adults and larvae of the confused flour beetle, *Tribolium confusum* DuVal (Coleoptera: Tenebrionidae)

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### Abstract

The insecticidal efficacy of the diatomaceous earth (DE) formulation SilicoSec (Biofa GmbH) against adults and larvae of the confused flour beetle, *Tribolium confusum* DuVal (Coleoptera: Tenebrionidae) was evaluated in laboratory tests. These tests were conducted at five temperatures, 22°C, 25°C, 27°C, 30°C and 32°C, and two relative humidity levels, 55% and 65%. SilicoSec was applied to three types of product, hard wheat, soft wheat and wheat flour, at four dose rates, 0.25, 0.5, 1 and 1.5 g/kg of each product. In order to assess the influence of larval instar on the efficacy of SilicoSec, the larvae were divided into two groups, young and old larvae, corresponding to 1–3 and 4–7 instar larvae, respectively. Similarly, adults were divided into three different groups, 1, 2 and 7-d old adults, respectively. For both adults and larvae, mortality on wheat or flour treated with SilicoSec increased with the exposure interval and the dose rate. Larvae were more sensitive to DE than adults, given that adults could survive exposure intervals and application rates that were lethal to larvae. The mortality of larvae and adults exposed to SilicoSec increased with increasing temperature. In contrast, the efficacy of SilicoSec notably decreased with the increase of relative humidity from 55% to 65%. Significantly, more adults and larvae were dead in SilicoSec-treated wheat than in treated flour. The efficacy of SilicoSec was substantially affected by the age of the exposed individuals. Young larvae were significantly more sensitive than old ones. Adults became significantly less susceptible to SilicoSec as their age increased from 1 to 2 and to 7 d.