

Title Effect of diatomaceous earths on the reproductive performance of *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae).

Authors Prasantha, B. D. R., Reichmuth, C. and Buttner, C.

Citation Advances in stored product protection. Proceedings of the 8th International Working Conference on Stored Product Protection, York, UK, 22-26 July 2002 (2003); 208-216

Abstract

The pulse beetle, *C. maculatus*, is a destructive pest of pulses in both storage and field. It is well known that diatomaceous earth (DE) kills the insects by locally absorbing the epicuticular lipid layers, leading to desiccation. However, the effectiveness of DE depends on its ability to kill the adults before egg-laying. Newly emerged virgin males and females of *C. maculatus* were exposed to the DEs, Fossil-Shield and Silico-Sec on 30 treated mung beans (*Vigna radiata*). Fecundity, number of beans used for egg-laying and beans without eggs were evaluated after 4 days; the number of unhatched eggs was evaluated after 10 days. F1 progeny inhibition was studied using 15 pairs of newly emerged insects. Immediate and later effects of DE were studied using two groups ("treated" and "transfer "). It was determined that the fecundity of female insects fell geometrically with increasing rate of DE content. Percentages of unhatched eggs, and seeds bearing no eggs, increased with increasing DE dosages. However, the maximum egg densities (eggs per seed used) occurred at 1200 mg DE/kg for both Fossil-Shield and Silico-Sec. The reason for such DE-stimulated behaviour of egg laying, expressed as a number of seeds with eggs of *C. maculatus*, is not known, but it may be related to the stress caused by the inert dusts or to the reduction of both chemical and physical (tactile) stimuli. Treatment with DEs altered the surface texture of the beans and caused less cohesion between eggs and the seed surface. Few larvae were able to penetrate the grains, possibly due to increased grain roughness and repellent effect of DE. A relatively high number of eggs was laid on the surface of those beans where the amount of dust had been locally reduced by adult movement and their pick up of DE. Therefore, several larvae tried to penetrate these treated beans, causing a high larval density per partially cleaned bean. Later effects of DEs were more significant than initial effects on mating and egg laying of *C. maculatus*. However, Fossil-Shield showed comparatively higher efficacy than Silico-Sec. DE particles that are packed up readily damage the external genitalia of females. Due to these, the number of progeny declined.