

Title Diatomaceous earth structural treatment against *Oryzaephilus surinamensis* (L.) (*Coleoptera: Silvanidae*) under fluctuating UK conditions.

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Abstract

The first UK trial to evaluate diatomaceous earth (DE) structural treatment was carried out during February 2002. A bin containing 20 t of "heating" insect-infested wheat resulted in migration of large numbers of *O. surinamensis* into the storage structure and surrounding area. The DE "Silico-Sec" was applied at approximately 10 g/m² to the outsides, undersides and concrete floor beneath a nest of six, galvanized steel 3x3x4 m bins. Hand-operated, electric and gas-powered dusters were compared for ease of treatment. I-SPy Insect Indicators, incorporating multi-species lures, were placed before and after treatment. The number of insects trapped from an initial average of 406 per trap was reduced by 86-100%. Before treatment, a sample of the population was used to set up bioassays in petri dishes containing 100 insects each. Paired bioassays, one uncovered and one closed, were designated as treated and untreated controls. The mean mortality increased from 52% at 7 days to 99% after 14 days and 100% after 21 days. The mean temperature for this period was 6 deg C with the relative humidity at 80%. The low temperature and high humidity allowed testing under the most challenging environmental conditions for the DE dust. Photographed tracks gave an indication of insect movement after treatment. The electric-powered duster proved too powerful for the treatment of the steel structure, blowing away the dust that had been applied. The hand-operated model was very flexible and the speed of the treatment could be easily adjusted. The smaller, gas-powered applicator was well-suited for the treatment of small areas.