

Title            Laboratory bioassay and dose variation of diatomaceous earth surface treatments.  
Authors        Cook, D. A. and Armitage, D. M.  
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#### **Abstract**

The efficacy of diatomaceous earth (DE) as grain protectant was evaluated. Grain samples were scooped from the surface of treated and untreated bulks of wheat and used to set up efficacy tests under controlled laboratory conditions. Bioassays were carried out at 10, 15 and 25 deg C, and moisture contents of 16-17% using two mite and two insect species. The mean percentage population inhibition was calculated for surface rates of 3, 2 and 1 g DE/kg after one generation. All rates resulted in 100% inhibition of the mite species *Acarus siro* and *Lepidoglyphus destructor*, with the exception of 1 g/kg at 25 and 15 deg C for *A. siro* and 2 g/kg at 25 deg C for *L. destructor* (99.9%). Among the insects, 100% inhibition was recorded for *Oryzaephilus surinamensis*, but an inhibition rate of only 61-99%, depending on the rate and temperature, was recorded for the developing stages of *Sitophilus granarius*. This reduction in population compared to the controls showed that the treatment affected the number of eggs laid. Samples from the 2 g/kg treatment were also used to estimate the evenness of surface treatment. The rate achieved across the surface was between 0.55 and 3.46 g/kg. Although uneven, there was no indication that this affected the efficacy between paired treatments. These results also suggest that DE treatments will still give protection during different stages of cooling and against surface populations that may occur during summer warming and prolonged storage.