EVALUATION OF A NEW DIATOMACEOUS EARTH (DE) FORMULATION TO CONTROL STORED-PRODUCT BEETLES.

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The toxicity of commercial formulations of diatomaceous earth (DE) applied to stored grains can be dependent upon a number of factors, including the source of the DE, the physical characteristics of the formulation, and the target insect species. Efficacy is usually reduced as grain moisture increases, however, temperature effects are often inconsistent and may be related to the conditions at which exposure trials are conducted. Also, most of the published research with DE products have involved direct application to grains. Several new formulations of DE, have also been labeled as a residual treatment to flooring surfaces. The purpose of this test was to determine: 1) exposure intervals required to kill red flour beetles and confused flour beetles exposed directly to DE and 2) effects of relative humidity and temperature on product efficacy.

Adult red flour beetles, *Tribolium castaneum* (Herbst), and adult confused flour beetles, *T. confusum* (DuVal), were exposed for 8-72 hours to the label rate (0.5 g per cm^2) of a commercial formulation used as a surface treatment, then removed and held for 1 week without food. Tests were conducted at 22, 27, and 32 °C; 40, 57, and 75% RH, and at each temperature-humidity combination mortality was assessed after the initial exposures and after the 1-week holding period.

Mortality of both species after initial exposure to DE was positively related to temperature and negatively related to relative humidity. Mortality generally increased as the exposure interval increased, and within each temperature mortality was usually lower at 75% RH compared to 40 and 57% RH. Mortality after the 1-week holding period was greater than mortality after exposure, indicating that the beetles continued to be affected by exposure to DE even after they were removed from the exposure arenas. The confused flour beetle was less susceptible to DE than the red flour beetle. At each temperature-humidity combination, confused flour beetles had to be exposed for longer time intervals than red flour beetles to obtain equivalent control.