Food-grade inert dust as structural treatment against insect pests

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Abstract

Insecticides that are used in empty silos can have poor insecticidal effects, insect resistance, and danger to applicators. Food-grade inert dusts developed domestically were applied for control of five major species of stored grains, *Rhyzopertha dominic*a (Fabricius), *Sitophilus zeamais* (Motschulsky), *Oryzaephilus surinamensis* (L.), *Tribolium castaneum* (Herbst), and *Cryptolestes ferrugineus* (Stephens) in an empty grain storehouse. The results showed that food-grade inert powder could uniform disperse the dust, and mortality reached 100% on the third day.

Keyword: duster, food-grade inert dust, empty storage, stored grain pests

1. Introduction

Insect pest management in empty grain storehouses is necessary to prevent economic damage Insecticides are currently used for insect control but there is an interest in alternative. The purpose of this research is to evaluate the use of inert dusts for insect control.

2. Materials and Methods

The food grade inert dust is a new non crystalline silica physical protective agent developed by the Academy of State Administration of Grain in the "Eleventh Five-Year Plan". Compared with the traditional diatomaceous earth, it has the advantage of good insecticidal effect, rapid toxicity and low cost. A mobile duster manufactured by the Tenghui Machinery Co., Ltd. was used to apply the dust. The test insects were *Rhizopertha dominica* (Fabricius), *Sitophilus zeamais* (Motschulsky), *Oryzaephilus surinamensis* (Linné), *Tribolium castneum* (Herbest), and *Cryptolestes ferrugineus* (Stephens).

The type of storehouse for testing was a large warehouse with area of 4885 m^2, length of 60 m, width of 27 m, the height of the grain pile of 6 m; the vertical distance from the storehouse floor to platform beam is 8 m, and the vertical height from platform beam to ridge is 2.5m. Petri dishes containing the test insects were placed throughout the warehouse to assess distribution of the dust.

3. Results and Discussion

Visual observation showed that the powder was dispersed evenly in the entire storehouse. From Figure 1, we can see that both the corners and walls were evenly covered. Excellent mortality of insects was obtained as well (Table 1).

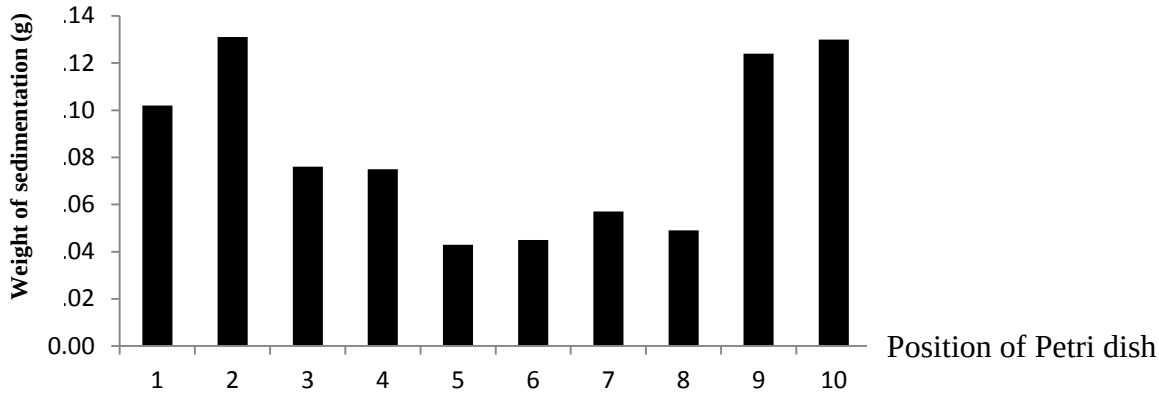

Figure 1 Weight of sedimentation of food grade inert powder at sample layout point after 24h.

Table 1 Mortality of 5 adult stored grain insects.

Test insect	Control group Average mortality ± SE (%)	Average mortality of test group ± SE (%)		
		24 h	36 h	60 h
Rhizopertha dominica	0.0±0.0	100.0±0.0	100.0±0.0	100.0±0.0
Sitophilus zeamais (Motschulsky		7.8±2.2	42.7±3.2	100.0±0.0
Oryzaephilus surinamensis		98.4±1.0	100.0±0.0	100.0±0.0
Tribolium castaneum		31.9±6.4	92.7±2.9	100.0±0.0
Cryptolestes ferrugineus		100.0±0.0	100.0±0.0	100.0±0.0

Table 1 shows efficacy of the dust at different times post-treatment.

4. Conclusions

This new product can replace conventional chemical pesticides. It is a natural product with potential development for broad application.

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