Ain Shams University
Faculty of Science
Entomology Department

Assessment of the potential of *Beauveria bassiana* and diatomaceous earth as alternatives to chemical insecticides for the control of *Rhyzopertha dominica* (F.) (Coleoptera: Bostrychidae) on wheat

By

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B.Sc. Entomology, Faculty of Science, Cairo University (1992)
M. Sc. Entomology, Ain Shams University (2013)

A Thesis
Submitted to the Faculty of Science, Ain Shams University,
For the Award of the Ph. D. Degree (Entomology)

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ABSTRACT

The wheat crop is the most important strategic crops in Egypt, because of its economic importance, directly related to the human diet in Egypt, the aim of this study is to find an environmental safe means to protect wheat from stored grain pests. Laboratory bioassays were conducted to assess the insecticidal efficacy of the two formulations of entomopathogenic fungus, *Beauveria bassiana* (Botani-Gard and Biosect), and two formulations of diatomaceous earth (DE) (Insecolo and Foodgrade), used alone or in combination, against the lesser grain borer, *Rhyzopertha dominica* adults on wheat grains. The results showed that, Dose and time dependent mortality was observed for all tested powders. Fungal formulations in DE provided better protection against the lesser grain borer by giving significantly better kill compared to control. The results showed a significant decrease in the number of emerged adults due to LC_{50} of tested powders-treated eggs. While, at LC_{95}, for all tested powders adults emergence was completely suppressed. All tested mixtures were able to prevent adult emergence completely, except the mixtures that consist of the LC_{25} of both tested materials. Residual activity of all materials and their mixtures gradually decrease with increasing storage periods up to 12 weeks for all treatments. No deleterious effect on the germination and the water absorption of wheat grains treated with the tested powders and their mixtures was noticed. The most promising fungus, Biosect was selected for in depth study. The results showed no side effects on the biochemical properties (total proteins, total carbohydrates, fat, starch, crude fiber, ash content and metabolic energy) of wheat grain after treatment with Biosect at the initial time and after storage. Biosect powder did not affect the baking quality of bread which was scored "good" for all acceptability parameters at initial and after 12 weeks storage. No adverse effect in the

biochemical parameters of liver (albumin, ALT, AST, total cholesterol and total proteins) and kidney (creatinine and urea) functions of the albino rats, with prolongation of the period post treatment when compared with those of the control group.

Keywords: lesser grain borer, *Rhyzopertha dominica*, entomopathogenic fungus, *Beauveria bassiana*, diatomaceous earth, , toxicity, wheat grains, baking quality, albino rats.

CONTENTS

LIST OF TABLES