

EFFICACY OF *BEAUVERIA BASSIANA* AGAINST *HYPOTHENEMUS HAMPEI*

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Summary

This study was done to determine the efficacy of *Beauveria bassiana* against a selected population of *Hypothenemus hampei*. Dry, coffee berry borer (CBB) infested, coffee berries were treated with different concentrations of *B. bassiana* (0.2, 0.4, 0.6, 0.8 and 1.0 g/L) in water and the mortality of adult CBB determined after 14 days. Treatment of the data by Probit analysis generated an LC₅₀ and LC₉₅ of *B. bassiana* to the CBB of 0.185 g/L and 1.648 g/L, respectively.

Introduction

Hypothenemus hampei is an important pest of coffee in Jamaica and since the late 1990s the Coffee Industry Board (CIB) of Jamaica has been working on a variety of control strategies with the ultimate goal of developing an integrated coffee berry borer (CBB) management programme. One of the control strategies they have been exploring is the potential of the entomopathogenic fungus *Beauveria bassiana*, in suppressing populations of the CBB. The current study was designed to assess the mortality of *H. hampei* in coffee berries treated with different concentrations of *B. bassiana* suspension and determine the lethal concentrations of *B. bassiana* to *H. hampei*.

Method and Materials

A biological assessment of *B. bassiana* against the *H. hampei* was done under laboratory conditions using dried CBB infested berries collected from Rose Hill in St. Andrew. In a preliminary experiment 10 ml of a 1 g/L solution of *B. bassiana* on rice was prepared using distilled water and a drop of Triton-X added. Ten randomly selected CBB infested berries were

dipped in the solution for 3 seconds and placed in a labeled petri dish. A similar number of berries were dipped in 10 ml of water containing a drop on Triton-X as a control. The treated berries were kept under laboratory conditions for 14 days after which they were dissected and the mortality of the CBB adults in the berries recorded. The experiment was done in duplicate.

Based on the results of the preliminary study, five concentrations of the *B. bassiana* on rice suspension (0.2, 0.4, 0.6, 0.8 and 1.0 g/L) that were expected to result in CBB mortality of 20-80% were prepared as described above. Six sets of ten randomly selected berries were treated with a selected concentration of the *B. bassiana* and the sixth treated with water and Triton-X as a control. Treated berries were placed in labeled petri dishes and stored and assessed as described earlier. This experiment was done in triplicate.

The data was subjected to a Probit analysis, using Polo PC software, to calculate the 14-day LC_{10} , LC_{50} & LC_{95} of *B. bassiana* to the CBB.

Results and Discussion

CBB mortality in berries treated with the concentrations of the *B. bassiana* suspension ranged from 33 to 77% (Figure 1). This fell within the acceptable level for a Probit analysis. A Probit analysis of the data generated 14-day LC_{10} , LC_{50} and LC_{95} values of 0.032, 0.185 and 1.648 g/L of *B. bassiana* (Table 1). It should be noted that the mass quoted is actually the mass of the *B. bassiana* as well as the rice on which it was cultured. So the actual concentration of the *B. bassiana* in the suspension would be actually less. While this data provides the first assessment of the lethal concentration of *B. bassiana* to the CBB in Jamaica, the results need to be verified. There is also the need to do this assessment against different populations of the CBB in Jamaica.

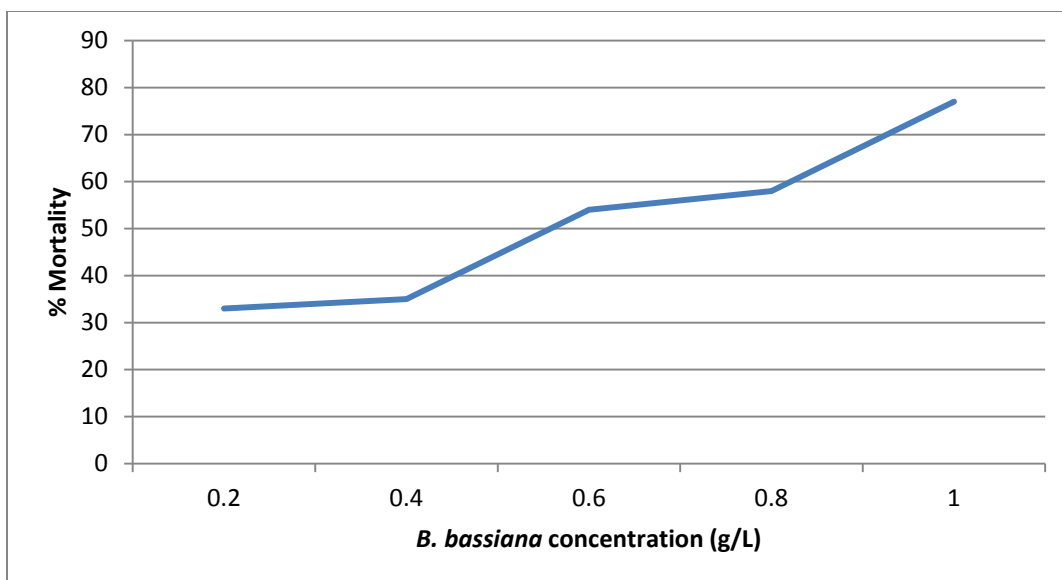


Figure 1: The effects of various concentration of *B. bassiana* on the mortality of *H. hampei* 14 days after treatment.

Table 2: The 14-day LC₁₀, LC₅₀ and LC₉₅ obtained at 95% fiducial limits of *B. bassiana* to *H. hampei* in dried coffee berries.

Lethal level	Lethal concentration (g/L)	Fiducial limits (95%)		Slope
		Lower	Upper	
LC ₁₀	0.032	0.018	0.048	1.709 ± 0.166
LC ₅₀	0.185	0.143	0.214	
LC ₉₅	1.648	1.236	2.474	