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Efficiency of Entomopathogenic Fungi to Sugarcane White Leafhopper, *Matsumuratettix hiroglyphicus* (Matsumura) (Hemiptera: Cicadellidae)

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Abstract

Sugarcane White Leafhopper, *Matsumuratettix hiroglyphicus* (Matsumura) (Hemiptera: Cicadellidae) is an economic important insect pest of sugarcane in Thailand. The three entomopathogenic fungi, *Metarhizium anisopliae* isolated from the sugarcane longhorn beetle, *Beauvaria brassiana* isolated from the brown plant hopper and *Purpureocillium lilacinum (Paecilomyces lilacinus)* isolated from *M. hiroglyphicus* were tested as biological control agents of *M. hiroglyphicus*. The results indicated that *M. anisopliae* isolated from *D. buqueti* showed the best pathocinity to *M. hiroglyphicus* adults with LC_{50} 7.39x10^6

Introduction

Sugarcane White Leafhopper, *Matsumuratettix hiroglyphicus* (Matsumura) (Hemiptera: Cicadellidae) is an economic important insect pest of sugarcane in Thailand. It represents as the reservoir of phytoplasma that cause sugarcane white leaf disease [1]. In recently, sugarcane white leaf disease spread out from the Northeastern region to the lower north region and the central region of Thailand. These causes sharply decrease in sugarcane yields. So that, entomopathogenic fungi become the discriminatory technique to control *M. hiroglyphicus*. This paper aims to evaluate the efficiency of three species of entomopathogenic fungi to *M. hiroglyphicus* adults in the laboratory.

Materials and Methods

Insect culture

The adults of *M. hiroglyphicus* were collect lively by setting the light trap in sugarcane field that having the white leaf disease at Bueng Samakkhi district, Kamphaeng Phet province. Then, transferred them to the National Biological Control Research Center, Central Regional Center, Kasetsart University, Kamphaeng Saen campus, Nakhon Pathom' s laboratory for rearing. They were reared on the one month sugarcane that placed in the rounded plastic cages until we prompted to do the experiment and bioassay.

Study on pathogenicity of three species of entomopathogenic fungi to M. hiroglyphicus adults

The experiment consisted of three species of entomopathogenic fungi that were *Metarhizium anisopliae* isolated from the sugarcane longhorn beetle, *Beauvaria brassiana* isolated from the brown plant hopper and P*urpureocillium lilacium (Paecilomyces lilacinus)* isolated from *M. hiroglyphicus* compared with control, distill water mixed with 0.05% Triton X 100. Each treatment consisted of five replications that were five adults per one Petri-dish. The trial done by dropping 1µl of 10^8 conidia/ml of each fungus on each adult. They were placed in 25±2 °C and 70±2% RH. The data were checked for ten days, the adults were checked that the spores of each fungus grow cover their bodies by the necked eyes. The data were collected and calculated by statistic tool.

Bioassay of *M. anisopliae* to *M. hiroglyphicus* adults

Metarhizium anisopliae was the better candidate of entomopathogenic fungus for controlling *M. hiroglyphicus* adults. We used five concentrations of *M. anisopliae*; 10^5, 10^6; 10^7; 10^8 and

10^9 conidia/ml compared with distill water mixed with 0.05% Triton X 100. Each treatment consisted of five replications that were five adults per one Petri-dish. The trial done by dropping 1µl of each concentration of each fungus on individual adult. They were placed in 25±2 °C and 70±2% RH. The data were checked for ten days, the adults were checked that the spores of each fungus grow cover their bodies by the necked eyes. The data were collected and calculated LC_{50} by probit analysis.

Results and Discussion

Pathogenicity of three species of entomopathogenic fungi to *M. hiroglyphicus* adults

Table 1: Percent mortality (%) and LT_{50} (days) of *M. hiroglyphicus* adults caused by *M. anisopliae*, *B. brassiana* and *P. lilacinum.*

Treatment	Percent Mortality (%)	LT50 (days)
Beauveria bassiana	76.00b	8.5
Metarhizium anisopilae	100.00a	3.71
P. lilacinum	68.00b	9.24
Control	0.00c	-

Percent mortality within a column followed by the same letter are not significantly different based on DMRT (P≤ 0.05).

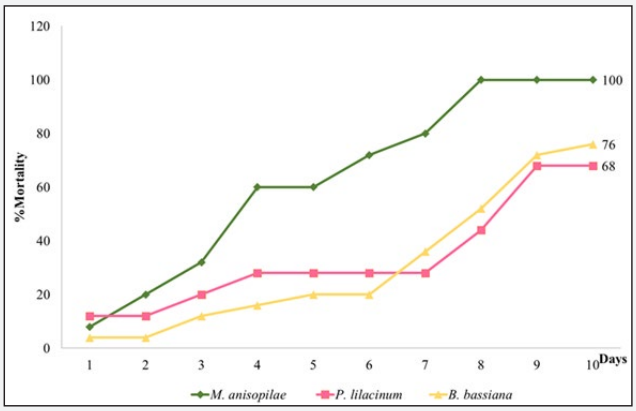

Figure 1: Percent mortality (%) of *M. hiroglyphicus* adults caused by *M. anisopliae*, *B. brassiana*, *P. lilacinum* within ten days.

The results of pathogenicity of the three fungi revealed that they can infect *M. hiroglyphicus* adults. Percent mortalities of M. hiroglyphicus adults were significantly different between the three fungi there were 100, 76, 68 and 0 percent by *M. anisopliae*, *B. brassiana, P. lilacinum* and control, respectively. The LT_{50} indicated that *M. anisopliae* showed the rapid mortality was 3.71 days followed by *B. brassiana*, *P. lilacinum* that were 8.50 and 9.24 days, respectively (Table 1) and (Figure 1). Vestergaard et al. [2] treated *M. anisopliae* to adult *Frankliniella occidentalis* with resulted in at least 94% mortality at 7 days post-inoculation. Annamalai et al. (2016) reported that *B. brassiana* showed percent mortality of 78.48% for the concentrations of 1.23×108spores/mL to *Thrips tabaci*. Jone et al. [3] reported that *M. anisopliae* strains were more virulent, with lower LT_{50} values, than were the *B. bassiana* strains [4].

Bioassay of *M. anisopliae* to *M. hiroglyphicus* adults

The result from pathogenicity indicated that *M. anisopliae* showed the highest percent mortality and lowest LT_{50} so that, we chosen *M. anisopliae* to do the bioassay to *M. hiroglyphicus* adults. The bioassay consisted of five treatments compared with control. The treatments were conidial suspensions $1x10^5$, $1x10^6$, $1x10^7$, $1x10^8$, $1x10^9$conidia/ml and control. The results revealed that *M. anisopliae* showed $7.39x10^6$ of the LT_{50} (Table 2). The probit analysis showed that R^2 was 0.9638 (Figure 2).

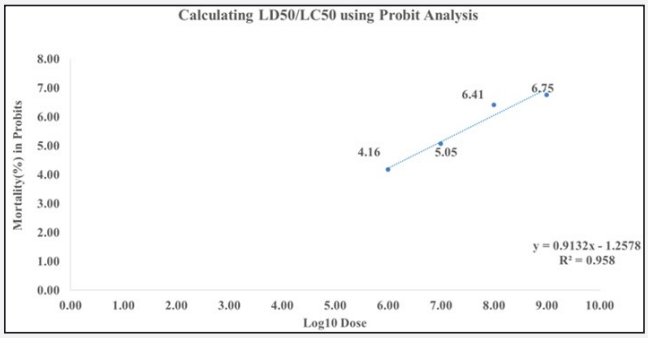

Figure 2: Probit analysis of five conidial suspensions of *M. anisopliae* to *M. hiroglyphicus* adults.

Table 2: LT_{50} of *M. anisopliae* to *M. hiroglyphicus* adults.

Conidia Suspensions	LC_{50}	95%Fiducial CI	
(Conidia/ml)	(Conidia/ml)	Lower	Upper
1x105	7.39x106	2.29x106	2.38x107
1x106			
1x107			
1x108			
1x109			
Control			

According to the results revealed that *M. anisopliae* isolated from *D. buqueti* showed the best pathocinity to *M. hiroglyphicus* adults with LT_{50} $7.39x10^6$. This fungus will be a promising biological control agent to control *M. hiroglyphicus* in sugarcane plantations.

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