FIELD EVALUATION OF COMPATIBILITY BETWEEN MOLASSES AND *Beauveria bassiana* on the control of *Metamasius hemipterus* Horn, 1873

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ABSTRACT - This research sought to study the compatibility between the molasses and the entomopathogenic fungi *Beauveria bassiana* (Balsamo) Vuill on the control *Metamasius hemipterus* Horn, 1873. The study was conducted on the Sítio Pitiá in the area of banana plantation of approximately 500 m^2, located in the municipality of Areia, Paraiba. The results of this study enabled the observation of the constancy this drills, independent of the type of trap (tile or cheese) ($p > 0.1000$, $F = 0.0711$). The results showed that the constancy of *M. hemipterus* was significantly higher in traps consisting of molasses+fungi ($P < 0.01$), and significantly lower in traps without fungi in baits and traps with molasses and only fungi. The frequency of *M. hemipterus* was accidental in traps with only *B. bassiana* (9.99%) and bait with no added molasses and *B. bassiana* (5.96%); incidental baits with added molasses (29.73%), and set traps in the presence of molasses + fungi (54.23%). Our results show that the food bait molasses along with the fungi *B. bassiana*, may be used in an integrated control of *M. hemipterus* in banana plantations.

Keywords: Capture; Efficiency; Weevil; Banana

AVALIAÇÃO EM CAMPO DA COMPATIBILIDADE ENTRE MELAÇO E *Beauveria bassiana* no controle de *Metamasius hemipterus* Horn, 1873

RESUMO - Esta pesquisa procurou estudar a compatibilidade entre o melaço e o fungo entomopatogênico *Beauveria bassiana* (Balsamo) Vuill no controle de *Metamasius hemipterus* Horn, 1873. O estudo foi conduzido no Sítio Pitiá, em área de plantio de banana de aproximadamente 250 m^2, localizado no Município de Areia, brejo paraibano. Os resultados deste estudo permitiram observar que a constância dessa braoca, independe do tipo de armadilha (telha ou queijo) ($p > 0{,}1000$, F: 0,0711). Os resultados evidenciaram que a constância de *M. hemipterus* foi significativamente superior em armadilhas constituídas de melaço+fungo ($P < 0{,}01$), e significativamente inferior em armadilhas com somente fungos. A freqüência de *M. hemipterus* foi acidental em armadilhas com somente *B. bassiana* (9,99%) e em iscas sem adição de melaço e *B. bassiana* (5,96%); acessória em iscas com adição de melaço (29,73%), e constante em armadilhas com a presença de melaço+fungo (54,23%). Os resultados desta pesquisa evidenciam que o atrativo alimentar melaço juntamente com o fungo *B. bassiana*, poderão ser utilizados de forma integrada no controle de *M. hemipterus* na bananicultura.

PALAVRAS-CHAVE: Captura; Eficiência; Brocas; Banana

EVALUACIÓN EN CAMPO DE LA COMPATIBILIDAD DE LA MELAZA Y *Beauveria bassiana* no controle de *Metamasius hemipterus* Horn, 1873

RESUMEN - presente investigación se pretende estudiar la compatibilidad entre la melaza y el hongo entomopatógeno Beauveria bassiana (Balsamo) Vuill en el control de Metamasius hemipterus Cuerno de 1873. El estudio se realizó sobre la Pitia del sitio en el área de las plantaciones bananeras de unos 250 m2, ubicado en el municipio de Areia, Paraiba pantano. Los resultados de este estudio proponen que no la constancia de braoca dependen del tipo de trampa (teja o queso) (p> 0,1000, F = 0.0711). Los resultados mostraron que la constancia de M. hemipterus fue significativamente mayor en las trampas que consiste de melaza + levadura (P <0,01) y significativamente menor en las trampas con hongos solamente. La frecuencia de M. hemipterus fue accidental en trampas con sólo B. bassiana (9,99%) y el cebo sin melaza añadida y B. bassiana (5,96%); cebos accidental con melaza añadida (29,73%), y constante en la presencia de trampas con melaza + levadura (54,23%). Nuestros resultados muestran que el cebo alimentario melaza junto con el hongo B. bassiana se puede utilizar en forma integrada para el control de M. hemipterus en el banano.

Palabras Clave: Captura,Eficiencia; Platano

INTRODUCTION

Metamasius hemipterus Horn, 1873 (Coleoptera: Curculionidae), a weevil that is widely distributed in Central and South America, as well as the West Indies. Generally it is regarded as a secondary pest of sugarcane, bananas, palms and many other tropical plants grown as ornamentals. The larvae bore into stems and petioles, thus weakening the plant and providing a pathway for penetration by fungi or other pests (GALLO et al., 2002). The development of resistance by many important insect pests, the continuous increase in of chemicals price used for the pest control, along with the concern about the environment protection has encouraged studies and use of biological control. One of the most important entomopathogenic fungi used as biocontrol agents is *Beauveria bassiana* Bals. Vuill. (Deuteromycota: Hyphomycetes), which is able to cause high levels of mortality in Coleoptera, Lepidoptera, Hemiptera, Diptera, Hymenoptera and Orthoptera (ALVES, 1992).

Several control measures can be taken to reduce the incidence of drill bits in banana plantations, such as the production of bait, you can type and type cheese tile, cultural control through the application of vegetation and microbial control, using entomopathogenic fungi (OLIVEIRA et al., 2010a; MALAQUIAS et al., 2010). The microbial control of pests is a branch of biological control is the rational use of entomopathogenic maintaining populations of target organisms below the economic threshold (OLIVEIRA, 2010; MOINO Jr, 2006). A viable alternative is the biological control of insects, this control can be done in several ways, involving different species, including other controller insects of agricultural pests. Entomopathogenic fungi are known and used worldwide as biocontroller agents of many agricultural pests, they have potential to control several insect orders (BRIDGE et al., 1990). The use of entomopathogenic microorganisms for pest control has grown in proportion to the interest in a pesticide-free farming chemicals, coupled with environmental preservation (ALMEIDA & BATISTA FILHO, 2006). To control of banana drill the fungi *Beauveria bassiana* has been shown to be feasible, reducing the insect population of the economic injury level (BURG & MAYER, 2006).

The entomopathogenic fungi *B. bassiana* is one of the most studied and used biological control agents of weevils in Brazil, this species of fungi occurs frequently on insects and soil samples, which can persist for a long time saprogenesis colonizing in the form field epizootic and enzootic (ALVES, 1998; 2004) oral infection can occur in some insects, and can penetrate the respiratory system via the spiracle (ROBINSON, 1966). As a result of harmful effects to humans and the environment, caused by chemicals, alternatives that reduce those problems and are compatible with other control tactics must be studied, so there is a growing demand other methods of control. The use of

bait in the presence of attractive food and entomopathogenic fungi may serve as a tool of paramount importance in monitoring programs and control bits in bananas, although the knowledge on the integrated use of these elements is considered undeveloped (OLIVEIRA et al., 2010b). Therefore this study aimed to assess the field compatibility between the food bait molasses with the entomopathogenic fungi in the control of banana weevils of the *M. hemipterus*.

MATERIAL AND METHODS

The study was conducted on the Site Pitiá in a banana plantation of approximately 250 m^2, located in the municipality of Areia, Paraiba. The fungi used was *B. bassiana* obtained by Boveril® product manufactured by ITAFORTE BioProdutos Company. The attraction was used molasses sugar, diluted with water (10%). In this study, we used the traps: cheese and tile. The fungal solution was prepared by diluting 30g product Boveril® in 2 liters of water, as proposed by Burg & Mayer (2006), the product was mixed and applied with or without the attractive molasses traps.

The experimental design was randomized blocks, distributed in a 2x4, and 2 types of traps: type cheese and tile. As each trap consists of the following treatments: only attractive, only fungus traps with fungus+attractive traps and only traps (control). Each treatment consisted of 3 blocks, each block consisting of 3 traps. To fulfill the requirements of ANOVA, data were transformed into $(x+0.5)^{1/2}$. The results were analyzed by SNK test. The data were subjected to analysis of constancy of each pest specie, the constancy was determined with the formula: C= P x 100/ T, where C= constancy index; P= total number of collections with a specific trap and pest species; N= total number of collections. Pest species and traps were classified in the following categories based on constancy indexes (BODENHEIMER, 1955; SILVEIRA NETO et al., 1976, GALLO et al., 2002): constant= present in more than 50% of collections; accessory= present in 25% to 50% of collections and accidental species= present in less than 25% of collections.

RESULTS AND DISCUSSION

The results showed that the constancy of *M. hemipterus* was significantly higher in traps consisting of molasses+fungi ($P < 0.01$), and significantly lower in traps without fungi in baits and traps and molasses with only fungi to *M. hemipterus*. In other hands, it was found that the frequency of *M. hemipterus* was accidental in traps with only *B. bassiana* (9.99%) and bait with no added molasses and *B. bassiana* (5.96%); accessory baits with added molasses (29.73%), and constant in the traps with presence of molasses+fungi (54.23%).

Allied to this tactic to control the bait with food baits in the case of molasses cane sugar, because they are inexpensive and easy to obtain (PEREIRA et al., 2005; 2006) can increase the efficiency of control of these insects in the field. Traps consisted of molasses and *B. bassiana*, were more promising for the control of *M. hemipterus*. Results obtained by Oliveira et al., (2010) confirm the practical possibility of using entomopathogenic fungi to control weevil banana, they observed with the frequency of *Cosmopolites sorditus* (Germar) (Coleoptera: Curculionidae) was classified as accidental in traps with only *B. bassiana* (23.44%) and in traps without the addition of *B. bassiana* and molasses (10.71%), and being accessory in traps consisting of molasses (28.43%) and in traps with molasses+fungi (37.27%).

The compatibility between these two products is of great importance, since the use of molasses along with *B. bassiana* did not affect the frequency of *M. hemipterus* traps. Moreover, the addition of *B. bassiana* is considered prolonged (BURG & MAYER, 2006), is unnecessary in most cases to repeat the application in the same year. As Fancelli et al. (2006) after the adult to be infected with the conidia, remains alive, helping to disperse the entomopathogen, even to areas not treated. Abraham et al. (2003) studying various concentrations of sugarcane molasses tested,

showed with three to six per cent molasses was found to be highly suitable for the radial growth, biomass production and spore production of *B. bassiana*. Therefore, the results of this research confirmed the possibility of integration of fungi and attractive food molasses bait, since the fungi former is considered viable, and the latter product can be readily obtained.

Table I. Effects of different forms of attractive baits clothing on the constance (Mean±SE)[1] of *Metamasius hemipterus*

Insect	Constance %			
	Only Baits	Molasses	Fungi	Fungi+ Molasses
M. hemipterus	5.96±0.32c	29.73±2.17b	9,99±6,06c	54,23±1,77a
Classification	Accidental	Accessory	Accidental	Constant

[1]Mean in original values; analysis of variance conducted with data transformed into $(x+0.5)^{1/2}$. Means followed by the same letter (into the line) did not differ significantly by SNK test (P = 0.05).

CONCLUSION

The results of this research show that the food bait molasses along with the fungi *B. bassiana* are compatibility and may be used in an integrated control of insects- pest *M. hemipterus* in banana plantations.

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