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“Bridging the gap between increasing knowledge and decreasing resources”

Organic Pest Management Strategies to Control the Cocoa Mirid (*Monalonia dissimulatum* Dist.), Alto Beni, Bolivia

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Abstract

The cocoa mirid (*Monalonia dissimulatum*) is one of the major pests in cocoa cultivation in Alto Beni, Bolivia. The most common control method is the manual removal of the nymphs. This practice is time-consuming, and therefore farmers often do not follow it. Hence there is an urgent need for more efficient practices to control this important pest.

This study evaluated the pathogenicity of two strains of *Beauveria bassiana* for the control of *Monalonia dissimulatum* on cocoa: a non-native, commercialised strain (Probiobass MR, Probiotec S.R.L.), and a locally isolated, native strain of Alto Beni, which is not yet commercialised. Moreover, a silicon-based product (TECSIL PM®) was tested. In addition, the effect of different degrees of infestation with *Monalonia dissimulatum* on different stages of cocoa pod development was examined. In order to investigate these questions, several field trials were carried out at the experimental station of Sapecho between June and September 2013.

The foreign *Beauveria bassiana* strain was the most effective bio-pesticide with a mortality rate of 63.3% in adults and 49.1% in nymphs. Cocoa pods in their early stages of development were highly susceptible to attack by *Monalonia dissimulatum*. On the other hand, fully developed cocoa pods showed a rather strong resistance to attacks: no effects on cocoa wet bean yield were recorded up to about 70% of damaged tissue on the surface of the cocoa pods. However, when the damage increased above 70%, it had a strong impact on yield, amounting up to 50.4% loss. Damaged pods started desiccating, and fully damaged pods completely desiccated causing total yield loss.

It is concluded that the foreign strain of *Beauveria bassiana* may be the most efficient to control *Monalonia dissimulatum* in the field. More on-farm field trials need to be conducted over longer time periods of time in order to elucidate whether the observed effects will be reflected in higher cocoa yields in the farmer's context. It is recommended to perform harvesting operations at regular intervals of two weeks in order to minimise losses caused by the desiccation of damaged cocoa pods.

Keywords: *Beauveria bassiana*, *Monalonia dissimulatum*, organic pest management, *Theobroma cacao*

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Evaluation of organic pest management strategies to control the cocoa mirid (*Monalonia dissimulatum* Dist.), Alto Beni, Bolivia



Figure 1: Adult of cocoa mirid (*Monalonia dissimulatum* Dist.)



Figure 3: Cocoa pod (early stage) completely damaged by a cocoa mirid nymph.



Figure 2A: Adult of cocoa mirid killed by *Beauveria bassiana* (white part: mycelium)

Background

- › The cocoa mirid (*Monalonia dissimulatum* Dist.) is the major pest in cocoa cultivation in Alto Beni, Bolivia (Figure 1).
- › The most common control method is the manual removal of the nymphs. This practice is time-consuming, so farmers often do not follow it. Hence the urgent need for more efficient control practices.

Objective

- › To evaluate the pathogenicity of two strains of *Beauveria bassiana* and a silicon-based product (TECSIL PM[®]) for the control of *Monalonia dissimulatum*. A non-native (Probiobass[®]) and a locally isolated, native strain of Alto Beni were tested.
- › To examine the effect of different degrees of infestation with *Monalonia dissimulatum* on different stages of cocoa pod development.

Materials and methods

- › Several field trials were carried out at the experimental station of Sapecho between June and September 2013.

Results

- › The non-native *Beauveria bassiana* strain was the most effective product, showing a mortality rate of 63.3 % in adults and 49.1 % in nymphs (Figure 2A and B).
- › Cocoa pods in their early stages of development were highly susceptible to attack by *Monalonia dissimulatum* (Figure 3).
- › Fully developed cocoa pods showed a rather strong resistance to attacks: no effects on cocoa wet bean yield were recorded up to about 70% of damaged tissue on the surface of the cocoa pods. However, when the damage increased above 70 %, it had a strong impact on yield, amounting up to 50.4% loss (Figure 4).

Conclusion

- › More on-farm trials need to be conducted over longer periods in order to elucidate whether the observed effects will be reflected in higher cocoa yields in the farmers' context.

- › It is recommended to perform harvesting operations at regular intervals of two weeks to simultaneously perform manual control of *Monalonia dissimulatum* in order to minimize losses at early stage pod development.

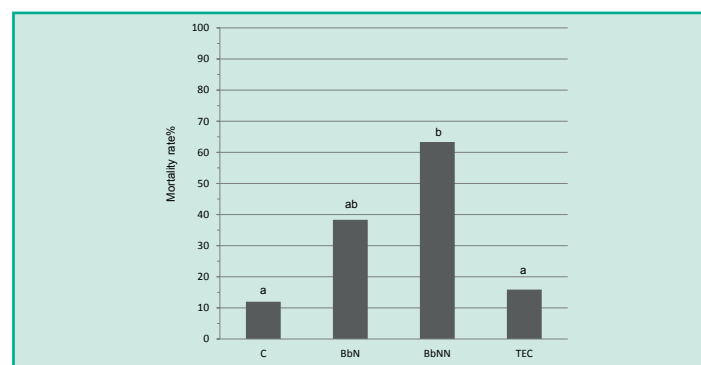


Figure 2B : Mortality rate of adults and nymphs induced by: BbN (*Beauveria bassiana*, native strain), BbNN (*Beauveria bassiana* non-native strain, Probiobass[®]), TEC (TECSIL PM[®]) and C (Control)

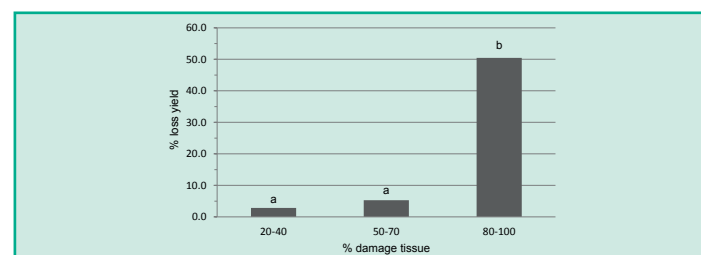


Figure 4: Loss of wet bean weight in different ranges of damaged tissue on the surface of cocoa pods

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More information

<http://www.systems-comparison.fibl.org/>

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