Evaluation of a bait for ant management in tropical fruit crops in Espírito Santo, Brazil

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Abstract

Research is being conducted in Espírito Santo, Brazil, to evaluate the use of a granular bait containing abamectin for control of ants associated with mealybugs that infest pineapple and other crops (coffee and cocoa) to reduce pest mealybug populations and mealybug wilt disease of pineapple. Results indicate that granular bait containing abamectin (0.01%) may be useful for control of ants in pineapple and coffee fields.

Keywords: *Formicidae*, pineapple, coffee, cocoa, abamectin

INTRODUCTION

As a vector of *Pineapple mealybug wilt-associated virus* (PMWaV) and co-factor in development of mealybug wilt disease, the pineapple mealybug (*Dysmicoccus brevipes*) is a major pest of pineapple throughout the world. Research in various regions indicates that use of baits containing insecticides to control ants symbiotically associated with mealybug pests in pineapple and other crops may be effective in reducing ant and associated mealybug pest populations (Taniguchi et al., 2006; Daane et al., 2008). Results of initial tests of several bait treatments in pineapple and other crops in Espírito Santo indicated that further evaluation of bait containing abamectin for management of ants in such crops is warranted (Culik et al., 2016). Therefore, we are currently conducting experiments to evaluate effects of bait containing abamectin for control of ants and associated mealybugs on pineapple (*Ananas comosus* var. *comosus*), coffee (*Coffea canephora*) and cocoa (*Theobroma cacao*) crops in Espírito Santo as part of continued development of integrated pest management (IPM) in this region, and we report initial experimental results here.

MATERIALS AND METHODS

Experiments in pineapple and coffee were conducted at the Instituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural (Incaper) Experiment Farm in Sooretama, and the cocoa experiment was located in Linhares, Espírito Santo. The pineapple study site consisted of an established field that was being used for production of planting material. Coffee and cocoa study sites were in established fields initially planted for clonal evaluations.

The experiments in each crop had a randomized complete block design with three replications consisting of 10×10 m plots separated by 15 m. Each block contained one treated plot with bait, and one untreated, control plot without bait. A granular bait for the experiments was prepared with the active ingredient (AI) abamectin (0.01%). At the start of the test in November 2016, bait (35 g) containing the AI was placed in a bait station (Perimeter Patrol) located at the base of one plant located at each corner of the treated experimental plots. Additional bait (35 g) was added after 2 weeks, and in January, March, April, and May for experiments in pineapple and coffee, and February, March, April, and May for the experiment in cocoa.

To evaluate the effects of the bait on ants, ant activity was monitored at the start of the experiment (pre-treatment), 2 weeks following the initial bait application, and at 4-week intervals thereafter, as follows: two open 50-mL plastic centrifuge tubes with untreated bait (5 mL) were placed in each plot and after approximately 1.5 h the tubes, with ants attracted to the bait inside, were closed and collected for transport to the laboratory for examination.

The ants captured in the tubes were subsequently counted and preserved for identification and reference. Because the ant activity data were not normally distributed a Box-Cox transformation was applied to the data for each crop and ANOVA was conducted using Assistat (Silva and Azevedo, 2016).

RESULTS AND DISCUSSION

The mean number of ants was significantly lower in abamectin-treated plots compared to untreated controls in the pineapple and in coffee (Tukey's HSD, $P<0.05$). Similar results were observed in cocoa but the difference was not statistically significant. Based on our initial observations abamectin appears to be effective in reducing ant populations in pineapple and coffee compared to the control with no bait treatment (Figure 1).

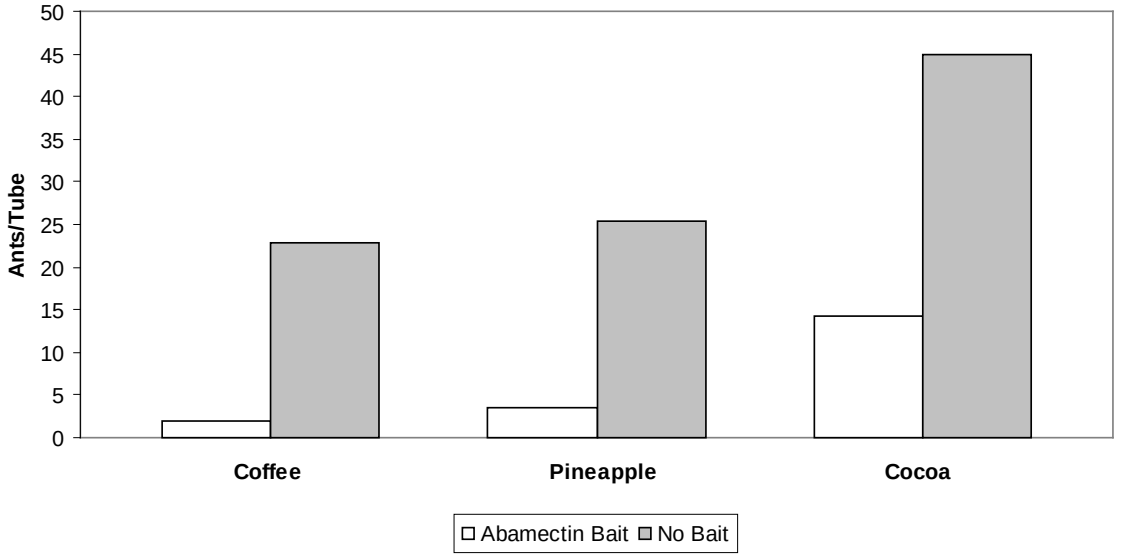

Figure 1. Effect of bait treatment on ants (mean number of ants per tube, 2-22 weeks after initial bait application, $n=36$) compared to untreated control in pineapple, coffee and cocoa crops, Espírito Santo, Brazil, December 2016 - May 2017.

These results indicate that 0.01% abamectin granular bait application at approximately monthly intervals and 10 m between baits was effective in reducing ant activity in pineapple and coffee crops tested. Additional studies will be conducted to verify these initial results and evaluate potential effects of the bait treatment on other factors such as mealybug and natural enemy activity.

ACKNOWLEDGEMENTS

This research was supported by the Fundação de Amparo à Pesquisa e Inovação do Espírito Santo (Fapes), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), and the Instituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural (Incaper). We thank T. Barreto, Syngenta, for providing abamectin, A. Gwara, B&G Equipment Company, for bait stations for testing, and C.A.S. Souza, Comissão Executiva do Plano da Lavoura Cacaueira (Ceplac), for enabling our research at the Ceplac Filogônio Peixoto Experiment Station, Linhares. We also thank G. Taniguchi and K. Daane for information and reprints concerning research on use of baits for ant control and pineapple pest management, and C. Barbosa for excellent help in the field.

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