Developing an Argentine Ant Baiting Program for Organic Agriculture

John H. Klotz, Michael. K. Rust, and Les Greenberg

Department of Entomology, University of California, Riverside, CA 92521

Summary

We have begun development of an ant baiting program for *Linepithema humile* (Mayr), the Argentine ant, to be used in organic agriculture. This project uses large bait stations to deliver liquid ant bait containing either 0.5% or 1% disodium octaborate tetrahydrate.

Introduction

Most products designed for controlling ants in agriculture cannot be used in organic crops. There are 2 essential ingredients for an effective ant baiting program: (1) a large, durable bait station, and (2) an ant toxicant that is acceptable to organic growers. Liquid toxicants work well with ants because they consume large quantities of sugary liquids, which the ants store in their crop. These ants then return to their nest and regurgitate portions of the liquid to other ants. Low concentrations of toxicants dissolved in these liquids are not repellent to the ants and act slowly enough so that it can be transferred to others. We have previously used borates and other products in sugar water against ants (e. g., Klotz et. al. 1998, 2000, 2002a, 2002b, 2003, 2004). Ants are a serious problem in organic agriculture because they protect destructive plant-feeding insects such as scale insects and mealybugs. Therefore, this project is very important to organic growers.

Objectives

I. To develop the use of ant bait stations in agriculture.

II. Using these bait stations to test existing ant baits containing borates

III. To determine the spacing of bait stations necessary for significant ant control.

IV. To determine the necessary frequency of re-filling these bait stations

Materials and Methods

I. Bait station

a

b

Fig. 1. a) KM AntPro™ Bait Station. The large reservoir holds up to 19 ozs. of liquid bait. **b**) At the base of the reservoir a sugary solution fills the trough, where the ants drink. Bait stations were refilled and cleaned as necessary.

II. Bait

- We used Gourmet Liquid Ant Bait (Innovative Pest Control Products, Boca Raton, FL), which contains 1% disodium octaborate tetrahydrate in a syrupy liquid. We used it both full strength and diluted 50%.

III. Monitors

Fig. 2. Sugar water monitors consists of 50 ml centrifuge tubes (15 ml tubes shown in photo) filled with 25% sugar water. The cap has a hole drilled in its center and is screwed down over a piece of Weedblock. This material has many tiny holes through which the ants can drink.

IV. Plots

- 21 plots were set up, each consisting of 3 rows by 5 trees, and measuring 40 x 50 ft. Rows were 20 ft apart and within rows trees were 10 ft apart.
- The center 3 trees of the center row of each plot were monitored weekly with sugar water monitors. Monitors were left on trees for 24 hrs. See Fig. 4 below.
- Consumption of sugar water from these monitors indicates the number of ant visits (Reierson et. al. 1998). Each ml corresponds to about 3300 ant visits.
- Bait stations were placed at the base of every other tree in the treatment plots, staggering the placement between rows of trees. Thus, there were 7 or 8 stations per plot. Stations were checked weekly and refilled when necessary.
- Each plot was a minimum of 70 ft from other plots
- Plots were blocked according to ant numbers, and within each block one of 3 treatments was randomly assigned: 100% of the liquid ant bait, a 50% dilution of the bait, or an untreated check.

Fig. 3. Citrus grove showing placement of bait stations at the bases of alternate trees.

Fig. 4. Ants entering bait station to feed on liquid toxicant. The small opening between the top and bottom of the station only allows in very small insects.

Results

Fig. 5a shows consumption of sugar water at the monitors at weekly intervals throughout the study. Each ml of consumption represents about 3300 ant visits to the monitor (Reierson et. al. 1998). For weeks 1 and 2 post-treatment, sugar water consumption in the treatment plots were significantly below the control plots as judged by ant visits to the monitors. However, the control plots also began to decrease after 2 weeks, showing that the treatments had contaminated the controls. Fig. 5b shows the grand means over time for sugar water consumption in the treatment and control plots.

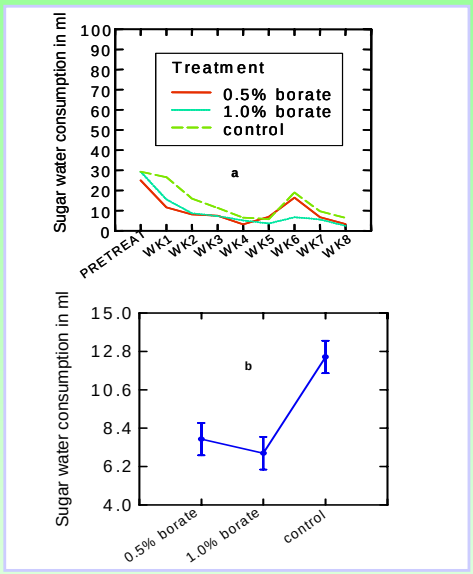

Fig. 5. a) Plot showing mean consumption of sugar water at monitors for each sample date. **b)** Plot of grand means of treatments and controls over all post-treatment sample dates. Both treatments are significantly lower than the controls, but are not different from each other ($F_{2,48} = 10.1$, $P = 0.0002$; mean comparisons using Tukey's HSD test).

Conclusions

I. The borates significantly decreased ant numbers as represented by consumption of sugar water.

II. Plot separation of 70 ft was not adequate to prevent ants in control plots from being affected by the treatments.

III. Next season we will try to determine the necessary density of bait stations for achieving control in the citrus grove.

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