

Efficacy of Diatomaceous Earth in Killing Red Imported Fire Ants in a Controlled Environment

Wizzie Brown, Extension Program Specialist- IPM
Texas AgriLife Extension Service

Introduction

A book on insects that includes natural solutions to pest problems is Texas Bug Book by C. Malcolm Beck and John Howard Garrett. This book is used often by Master Gardeners and others who attend my seminars to identify pests and to acquire tips on how to best manage said pests. In the section on fire ants, Mr. Beck writes of a test he carried out using diatomaceous earth (DE) where he put a teaspoon of brand 1 DE in the first jar and a teaspoon of brand 2 DE in the second jar then adding 6 tablespoons of red imported fire ants to each jar. He then observed the jars to see how long it took the DE to kill the fire ants.

I decided to take Mr. Beck's experiment and replicate it scientifically and include a control and standard to compare the DE treatment.

Materials & Methods

The trial was established, September 26, 2007 (12:45 p.m.). Three jars were labeled with each treatment, for a total of nine jars.

Treatments:

1. Untreated control (check) – no treatment
2. Results® Fire Ant Control (Diatect International, Herber City, UT) – 82.9% silicon dioxide, 0.2% Pyrethrins, 1.0% piperonyl butoxide; 1 teaspoon per each jar
3. Natural Guard Crawling Insect Control Containing Diatomaceous Earth (Voluntary Purchasing Groups, Bonham, TX) – 85.0% silicon dioxide, 10% other elemental oxides; 1 teaspoon per each jar

Control jars had only fire ants added, all other jars had 1 teaspoon of the treatment chemical added to the jar before the addition of imported fire ants. Six tablespoons of red imported fire ants, all from the same mound, were added to each jar. All jars were checked for fire ant activity 3, 8, 19 and 24 hours after treatment and continuing daily until all fire ants within the jars were dead (through 768 hours/ 32 days). Jars were lightly agitated and observed for fire ant activity. If no ants in the jar were moving, the jar was marked as nonactive. Jars were maintained at room temperature and out of direct sunlight.

Results & Discussion

By 8 hours after treatment, all imported fire ants in the jars containing Results® Fire Ant Control were dead (Fig. 1). Fire ants in untreated jars were all dead at 25 days

after treatment while it took 32 days to kill all fire ants in jars treated with Natural Guard Crawling Insect Control. The Results® Fire Ant Control treated jars died quickly, most likely because the product has added pyrethins and the synthetic chemical synergist piperonyl butoxide (PBO). It is possible that diatomaceous earth was not the cause of death of the imported fire ants and they may have died from natural causes since the jars treated with Natural Guard Crawling Insect Control died after the control jars.

Diatomaceous earth kills insects by abrading the waxy covering of the insect exoskeleton and absorbing protective oils which leaves the insects vulnerable to water loss. Products with diatomaceous earth as an active ingredient would best be utilized in a low moisture environment to provide best results. When used in high moisture areas, diatomaceous earth products may not work as well due to the fact that the insect may be able to maintain moisture within its body due to the moisture in the surrounding area. The jars utilized in this experiment maintained moisture levels as they remained sealed, so it is possible that the diatomaceous earth did not act as it would in a low humidity environment.

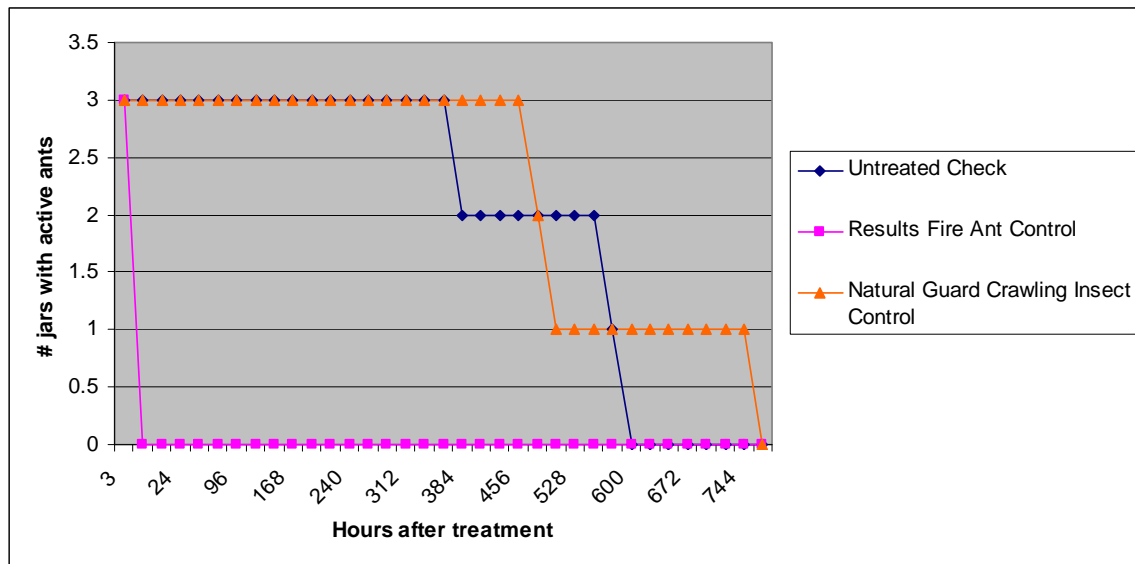


Fig 1. Activity of imported fire ants over time with various treatments.

Literature Cited

Beck, C. Malcolm and John Howard Garrett. Texas Bug Book. Austin: University of Texas Press, 1999.