CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
Lacey A. Benefiel

Project Number
S1505

Project Title
The Effects of Lethal Concentrations of Environmentally Friendly Capsicum frutescens Pesticides on Acheta domesticus

Abstract

Objectives/Goals
My purpose was to find a type of pepper and a concentration level that would not only be successful, but would also not harm the environment. I am trying to find an environmentally friendly pesticide because there are many factors in a chemical pesticide that can be harmful to both the environment and the organisms that live in it. This is a 3rd year continuation of my previous projects.
After performing the experiment, I statistically analyized my data so that I knew whether or not my collected data was valid. Then, I was able to determine which pepper was still lethal but could be produced as a pesticide most cost effectively by using the lowest concentration. I also determined whether there was a difference in the mortality rates between the 3 peppers.

Methods/Materials
First I liquified the 3 peppers (chile pequi, chile de arbol & chipotle) so I could spray them like a pesticide. I tested the peppers using a total of 50 crickets per concentration level. After spraying the pesticide on the crickets, I observed how many died every 15 minutes until an hour was up. I started out at full concentration for each pepper and reduced the concentrations by half until the pesticide was no longer lethal.

Results
After looking over my results I got from my 3 peppers at different concentration levels, I found that chile de arbol was very lethal, even at a low concentration. Chile pequin was almost as lethal as chile de arbol, but could only go down to 1/2 the concentration to be as effective as the full amount. The canned chipolte was the weakest out of the 3 peppers.

Conclusions/Discussion
After conducting my experiment this year, I was able to come up with a sufficient amount of data to be statistically analyzed. The two statistical tests a professor from CSUF helped me run on my data was the Two-Way ANOVA test and the Student-Newman-Keuls (S-N-K) test. The conclusions I drew from the ANOVA test was that my data had too much of a pattern to be caused by chance. After I ran the S-N-K test, I found that by using either chile pequin or chile de arbol at 1/2 concentration would be just as effective and less costly to produce. I am currently running another statistical test to find the rate of kill for each pepper as well as analyzing and comparing the different peppers at the different concentration levels.

Summary Statement
I am finding an environmentally friendly pesticide by testing three separate peppers: chile pequin, chile de arbol, and chipotle, and finding a concentration that is as effective as the full concentration.

Help Received
Mother assisted with layout of the board; Father helped by buying materials; teacher and science advisor allowed me to run experiment in his room; former professor at CSU Fresno helped with statistical analysis.