CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
J1530

Project Title
A Bioassay Detecting Pesticide Toxicity using Artemia salina

Abstract

Objectives/Goals
The effects of three different pesticides pyrethrin, bifenthrin, and carbaryl were tested in a biological system. The goal of my project was to discover how varying concentrations of pesticides might affect the viability of Artemia salina, or brine shrimp. I also exposed the pesticides to weather to monitor degradation due to light or temperature. A. salina was used because brine shrimp are both highly susceptible to changes in the environment and important to the ecosystem.

Methods/Materials
A. salina was cultured in artificial sea water and used in the assay on day four of development. The brine shrimp were first incubated with increasing concentrations of insecticide in a 96-well plate with eight replicate wells. I then developed my own method of assessment, using an overhead projector and at least 10 Artemia in each of 16 petri dishes. In this way I could view all results simultaneously by projecting the Artemia images on a wall continuously. The Artemia were observed at various time intervals until at least half from each group were dead. The times of death were recorded.

Results
Data generated from the bioassay indicated the method was reliable, as the standard deviation was small (<15%). The assay was able to detect differences between the degraded pesticide toxicity, as well as the increased susceptibility of older Artemia to pesticides. Based on the results, when all three insecticides were compared, pyrethrins seemed to have the greatest adverse effect on A. salina viability. The bifenthrin compounds also seemed to resist biodegradation most.

Conclusions/Discussion
The results of this study support the hypothesis that pesticide toxicity and potency can be quantified using an Artemia salina bioassay. Artemia mortality depended greatly on the pesticide tested, which indicated that some pesticides were more toxic than others. The differences found between pesticides after exposure to the environment indicated this assay could be useful in distinguishing between environmentally "friendly" and more persistent toxins.

Summary Statement
This bioassay examined the toxicity of varying concentrations of three pesticides and the rate at which the pesticides biodegraded as quantified through a unique methodology using Artemia salina.

Help Received
Father helped with science equipment; science teacher helped proofread report; friends helped provide moral support