CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
J1511

Project Title
Aquatic Herbicides: Wanted vs. Unwanted Effects

Abstract

Objectives/Goals
Copper sulfate is a widely used aquatic hericide. It is used to kill 'weeds' in ponds, lakes and streams. Since it is added directly to water, where other desirable organisms live, I wanted to know if the use of copper sulfate could cause unwanted biological harm to non-target organisms. I investigated if copper sulfate,in similar used amounts, affects cell respiration in general because most cells respirate with oxygen, and if could get into food chains.

Methods/Materials
I first prepared the copper solutions. For cell respiration I soaked pea seeds in 2,4 and 6ppm copper sulfate. I placed the germinating seeds in self-made respirometers made of a test tube,glass tube, and cotton soaked with KOH to absorb the carbon dioxide exchanged for oxygen. Pea seeds soaked in plain water were used for controls. For the food chain investigation I first cultured Daphnia, a fresh water crustacean. Using a spectrophotometer I measured how much copper sulfate was in the water before and after 30 hours with Daphnia and for controls of water with the same starting amount of copper sulfate but no Daphnia.

Results
I did multiple trials on all tests. Cell respiration rates were an ave of .55cm/min for controls but only .35,.24 and .1cm/min for 2,4,and 6ppm exposures respectively. For Daphnia copper uptake, controls changed only an ave. -.026mg/l Cu, while ,after I was careful to rinse water off Daphnia back into test solutions, the ave change of copper in solution was greater at -.75mg/l Cu.

Conclusions/Discussion
I found cell respiration which is essential for many non-target and desirable organisms was slowed by this popular aquatic herbicide. Copper lowering in solutions with Daphnia also suggested it could get into food chains by uptake where fish ,birds and maybe people could be exposed.My hypothesis was supported that copper sulfate could do more harm than just killing aquatic 'weeds'

Summary Statement
Does copper sulfate, an aquatic herbicide, do more biological harm than just kill 'weeds'?

Help Received
Brother helped with graphs, mother with typing, teacher with loan of and instruction on equipment.