



CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY

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**Project Title**  
**Aquatic Herbicides: The Effects of Copper Sulfate on Non-Target Organisms and Food Chains**

**Abstract**

**Objectives/Goals**  
 Many kinds of pollutants enter lakes, ponds, streams because of our industry and agriculture, even chemicals that we use around the house. What happens when these substances enter the water where desirable living things exist? Can these pollutants actually come back to us? For instance, we add chlorine and fluorine to purify water and fight cavities. Copper sulfate is added throughout North America, and the world to kill unwanted water "weeds". We proposed a hypothesis, and an experiment, that aquatic herbicides like these may do more harm than expected.

**Methods/Materials**  
 What we wanted to know was how these additives, in this case copper sulfate, effect living things by testing: a) the effect of various concentrations of copper sulfate on pea seed respiration rates during germination. We did this by building a respirometer. (This could show larger effects because useful aerobic organisms use oxygen and respire in a similar way) and b) to see if copper sulfate could be absorbed into the food chains of biological communities. We did this by measuring the amount of copper sulfate absorbed by invertebrate animals and water plants. This effect was measured with colorimetric analysis using a spectrophotometer.

**Results**  
 In phase one, observed respirometer rates, for example 2ppm copper sulfate, consistently reduced pea seed gas exchange rate over controls with no copper sulfate. In phase two, the spectrometer showed lowered values of ppm copper sulfate in solution after 24 hours of exposure with test organisms compared to little or no change in copper concentration if no organisms were present in controls.

**Conclusions/Discussion**  
 Respirometer data suggests our initial hypothesis may be supported. Since many desirable organisms respire, copper sulfate may be hurting more organisms when added to natural systems at about the same concentrations we used. And, uptake is suggested by the spectrophotometer data. Once into lower food levels the copper could enter the food chains of ecosystems. Bio-amplification would be a significant follow-up study. In conclusion, data suggests copper sulfate, a widely used aquatic herbicide, may do more harm than just killing "weeds".

**Summary Statement**  
 Does copper sulfate, a widely used aquatic herbicide, actually do more harm than just kill "weeds"?

**Help Received**  
 High school use of spectrometer and glassware. Father drove us to river site. Mother helped proof read report