



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

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Project Title Death Metal: Heavy Metals and Their Effect on Plants	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our objective was to determine the effects of heavy metals on the survival of plants and the tropic responses of their roots. We also wanted to determine if the response is the same for garden plants and wetland plants.</p> <p>Methods/Materials We tested the effect of copper chloride and zinc chloride on the growth of three species: radish and lettuce, which are garden plants, and the wetland plant, jaumea. We grew the plants hydroponically in solutions with 0.1, 0.01, or 0.001 g of the metal salt and compared them with controls grown in nutrient solutions made with Flora Gro. To test the effects of heavy metals on gravitropism seeds were germinated in the heavy metal solutions and set to grow in water. After one day the angle of deviation of the roots from vertical was measured.</p> <p>Results After 1 week, almost all of the garden plants in the 0.1g treatments were dead, but none of the wetland plant jaumea. Copper did the most amount of damage. Zinc was less poisonous. In the gravitropism experiments, the angle of deviation of the roots from vertical increased with increasing concentration of metal. Radishes showed a greater deviation from vertical than lettuce. Jaumea roots did not show sufficient variation from vertical to draw a conclusion that heavy metals affect its tropic responses.</p> <p>Conclusions/Discussion High concentrations drastically affect the survival of lettuce and radish. They do not seem to have an effect on jaumea as very few died. Wetland plants may have a greater tolerance for heavy metals in their water. Heavy metals seem to have a negative effect on the tropic responses of garden plants. They did not however seem to affect the wetland plant.</p>	
Summary Statement We tested the effect of different heavy metals, at different concentrations on the growth and gravitropic response of the garden plants, lettuce and radish, and the wetland plant jaumea.	
Help Received Ms. Britts for transportation and support. Dr. Philippa Drennan for giving us the copper chloride and zinc chloride, and for her advice. Mrs. Fricke for her advice and trust when we were dealing with heavy metals in her classroom.	