



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Rajiv K. Nelakanti	Project Number J1018
Project Title The Effect of Acidity on Phytoremediation of Copper Using Brassica juncea (Indian Mustard) Plants	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals It is important to remove metal contaminants such as copper from soil. Environment scientists are promoting phytoremediation of soil due to its low cost and environmental friendliness. The scientific purpose of this project is to understand if acidity affects phytoremediation of copper in soil by Brassica juncea plants. I hypothesize that Brassica juncea seeds germinate in copper sulfate concentrations up to 10 ppm; anything higher would be too toxic for germination. I also hypothesize that pH 6.0 plants take up the most percentage of copper from soil.</p> <p>Methods/Materials In Part 1 of my experiment, I tested different concentrations of copper sulfate that the mustards could tolerate during germination. I used 0, 5, 10, and 50 ppm of copper sulfate solutions, including the acidity variable at pH 6.0, pH 6.5, and pH 7.0. In Part 2 of my experiment, I watered Brassica juncea plants with 10 ppm concentration of copper sulfate, while adding HCl acidity (pH 6.0 to pH 7.0) to the mixtures. For my control group I watered distilled water with HCl acidity (pH 6.0 to pH 7.0). I watered the same amount of solutions and kept the plants in the same general area. The plants were grown for 13 days. At the end of the experiment, both soil and plants were tested for copper accumulation using the Copper CHEMets Kit. The relative growth, and the amount of copper accumulated in the plant tissue was studied to understand the effect of acidity on the phytoremediation of copper.</p> <p>Results From Part I results, all the seeds germinated normally except for the 50 ppm copper sulfate concentration. pH levels did not affect the germination results much. But, the higher the copper concentration, the worse the seeds germinated. From Part II results, the higher the pH, the more the mustard plants accumulated copper. The pH 6.0 plants' mass accumulated 0.5 ppm copper whereas the pH 7.0 plants' mass took up 0.15 ppm.</p> <p>Conclusions/Discussion The results of my experiment show that Brassica juncea plants are better at phytoremediation of copper in acidic soils, which is a new finding. This may help speed up cleaning efforts for copper contaminated areas, like old copper mining facilities.</p>	
Summary Statement The Brassica juncea plants accumulated more copper in more acidic soils and the seeds germinated best at 10 ppm of copper sulfate and lower.	
Help Received My father and my science teacher, Ms. Heinke, helped me in preparing the copper solutions. Also, my father supervised the project. My mother helped with the making of the project board. Finally, my brother proofread my project write-up.	