



CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

Name(s) Serena E. Tang	Project Number J1027
Project Title Earthworms: A Cost-Effective Solution for PCB Soil Contamination?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals As of 2008, there were 40,000 sites in the US that contained contaminants such as polychlorinated biphenyls (PCBs). PCBs are a man-made organic chemical that are found everywhere in our environment. Not only are PCBs carcinogenic in humans, but they are also difficult to biodegrade. To peoples' dismay, there has not been a single developed method that has met all of the requirements to safely remove PCBs from the environment. Therefore, the goal of my project was to find an efficient, cost-effective, and environmentally friendly way to remove PCBs from soil using the vermi-remediation method. Based on my research, I hypothesized that the earthworms would bioaccumulate significant amounts of PCBs within their bodies, suggesting that they may be an effective tool for PCB soil decontamination.</p> <p>Methods/Materials In total, there were three concentrations: 50 ppb, 200 ppb, and 1,000 ppb. With each concentration, there was a control jar (no worms), and an experiment jar (50 worms). Once all six jars were spiked with the above PCB concentrations and 50 earthworms were added to each of the three experiment jars, they were left alone for two weeks. At the end of the two weeks, I extracted a soil sample from all six jars using the Incremental Sampling method, and tested them for PCBs. This step was repeated at the end of the fourth and sixth week period. At the end of the six weeks, I also extracted all the earthworms from the soil in the experiment jars and tested the worms for PCBs as well. With the data collected, conclusions were made.</p> <p>Results My results can be best explained when split into two parts. Regarding the levels of PCBs found in the soil, there was an inconsistent recovery rate over the six week experiment. However, the results of the PCB concentrations in the earthworms' bodies showed a much more consistent pattern. The earthworms in all three jars had bioaccumulated significant levels of PCBs in their bodies at the end of the experiment. In fact, all of the earthworms contained approximately 50% of the original amount of PCBs added to the jar.</p> <p>Conclusions/Discussion Despite the inconsistent recovery rate of PCBs in the soil, my hypothesis was still supported based on the data regarding the levels of PCBs found in the earthworms' bodies. Because significant levels of PCBs had bioaccumulated in the earthworms, the data suggests that earthworms had removed PCBs from the soil within the six week experiment.</p>	
Summary Statement Earthworms were used as a cost-effective, efficient, and environmentally friendly method to remove polychlorinated biphenyls from soil.	
Help Received APPL Labs allowed me to use their lab equipment and helped acquire the materials necessary for my experiment. My mom helped me put my board together.	