



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Smita Mascharak	Project Number S0815
Project Title Phytoremediation of Lead Using Brassica nigra: A Solution for the Fort Ord Clean-Up?	
Objectives/Goals Some plants (called hyperaccumulators) have been shown to accumulate heavy metals from soil. The purpose of this experiment was to find out if lead in soil could be phytoremediated using Brassica nigra (black mustard) and if the addition of EDTA sped up this process. I hypothesize that the plants will accumulate a substantial amount of lead and that the addition of EDTA will increase the total amount of lead collected by the plants.	
Abstract Methods/Materials A set of one hundred seedlings of B. nigra was grown in a greenhouse at UCSC. The plants were divided into 5 sets of 16, properly marked, and then lead (as lead nitrate) was added to the soil as follows: A (control), B1 (400 ppm lead, no EDTA), B2 (400 ppm lead, EDTA), C1 (2000 ppm, no EDTA), and C2 (2000 ppm, EDTA). After regular feeding and watering for 4 weeks, the first "harvest" of plants collected, dried and ground to obtain samples for lead analysis. Aliquots of 50 mg of the dried samples were digested in 2 mL of 1:1 HNO ₃ : HCl mixture, diluted and the amounts of lead present in the sample solutions were determined by Atomic Absorption Spectroscopy. The whole process was repeated with samples of the second "harvest" (collected after 8 weeks). One C2 sample from the second harvest was separated into stem, root, seedpod and leaves/flowers and each part was separately analyzed for lead. The roots from each category from the third harvest (collected after 12 weeks) were also analyzed.	
Results As hypothesized, the B. nigra plants showed a steady increase of lead accumulation throughout the first two months. EDTA facilitated the process of lead accumulation. The amount of lead in the plants was proportional to the concentration of lead in the soil. The roots contained the highest amount of lead. However, significant amounts of lead accumulated in the portion of the plant above ground as well.	
Conclusions/Discussion The results of this experiment demonstrate the feasibility of phytoremediation in relation to the high concentration of lead in the soil of Fort Ord.	
Summary Statement The purpose of this experiment is to find out if lead in soil can be phytoremediated using black mustard.	
Help Received Jim Velzy and Linda Locatelli provided greenhouse facilities at UCSC; Matt Hurst helped me in the lead analysis by AA Spectroscopy; My father, Pradip Mascharak, helped with the background information and in assembling the poster; Lynda Rogers oversaw the progress of the whole project.	