CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)

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Project Number

22836

Project Title

Gettin' Grubby: The Trace Metal Contamination of Plants Grown in Soil Amendment

Abstract

Objectives/Goals

My Question was "Will plants grown in soil amendment contain more trace metals than plants grown in unamended soil?" I researched trace metals and their effects on plants and was able to hypothesize that "Plants grown in soil amendment will contain more trace metal contamination than plants grown in unamended soil."

Methods/Materials

I grew two hundred radish and lettuce plants in both a ten percent and twenty five percent mixture of four differant amendments and in unamended soils. The amendments I used included biosolid, nitrohumus, manure and compost. Preliminary testing was using an electro atomic spectrophotometer to test the sox and soil amendments for twenty four differant trace metals. After forty days the plants were removed from the soil mixture and cleaned. After drying in an oven the plants were crushed and tested for the samx twenty four trace metals using an electro atomic spectrophotometer.

Results

My resulting data was extensive. Trace metal contamination was compared using a differance and percex differance ratio. Nearly all plants grown in a soil amendment contained more of each trace metal than did plants grown in unamended soil. This was both a negative and positive effect. For example, the ediblx portion of lettuce grown in ten percent manure contained 10,653.77 parts per million sodium, which is the same as one percent sodium and nearly toxic to the plant. The same plant grown in unamended soil contained only 1,435.5 parts per million sodium. With 19.85 parts per million manganese in the ediblx portion of lettuce grown in unamended soil the plants were deficient of manganese. The same plant grown in ten percent compost contained 61.49 parts per million manganese, this level is no longer considerx deficient. Manganese is an important micronutrient.

Conclusions/Discussion

Amendments are used to correct deficiencies and to improve the plant. If the amount of trace metal in the soil does become toxic, the plant will usually show symptoms of its toxicity so that the cause can be found and corrected. In order for the contamination to become so toxic that it is unsafe for human or animx consumption, the amount of that trace metal often must be more than most plants will tolerate. This could be seen in my project when neither lettuce nor radish would grow in soil amended with biosolid that contained toxic levels of Sodium and Lithium.

Summary Statement

Through my experiment I identified increased amounts of trace metals in plants grown in several soil amendements and discussed the effect of these increased levels on the plant.

Help Received

University of California at Riverside Professor Christopher Amrhein allowed me access to and guidence in his laboratory