Phytoremediation Design for Community Garden
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Abstract

This research project investigates lead exposure in urban areas, focusing on community gardens with lead-contaminated soils. Lead exposure causes brain damage, IQ decrease, and behavioral problems. Lead is one of the health risks that can be prevented in children. The study measured concentrations in the vegetable community garden to minimize lead exposure to citizens for whom the vegetables are provided to encourage heart-healthy options for their diets. Phytoremediation has been designed to gate lead and prevent the accumulation in vegetables.

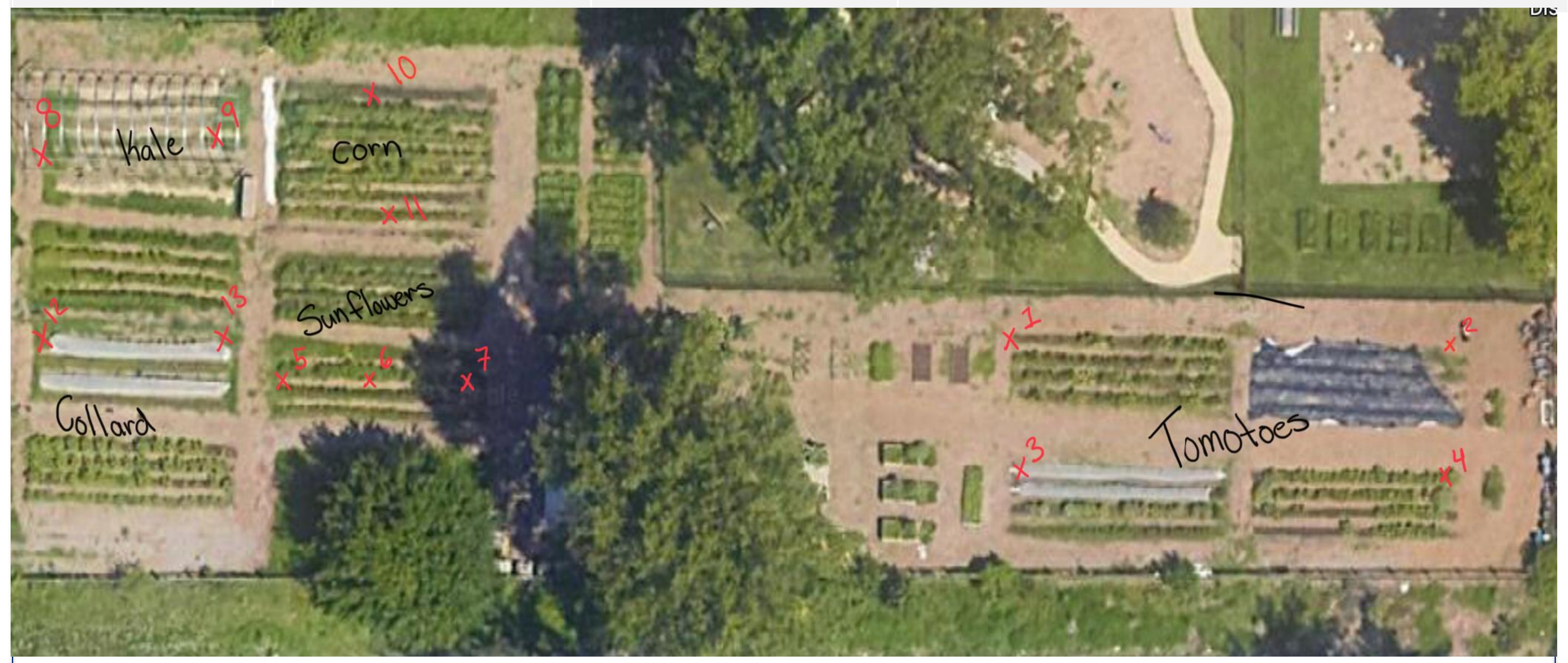
Introduction

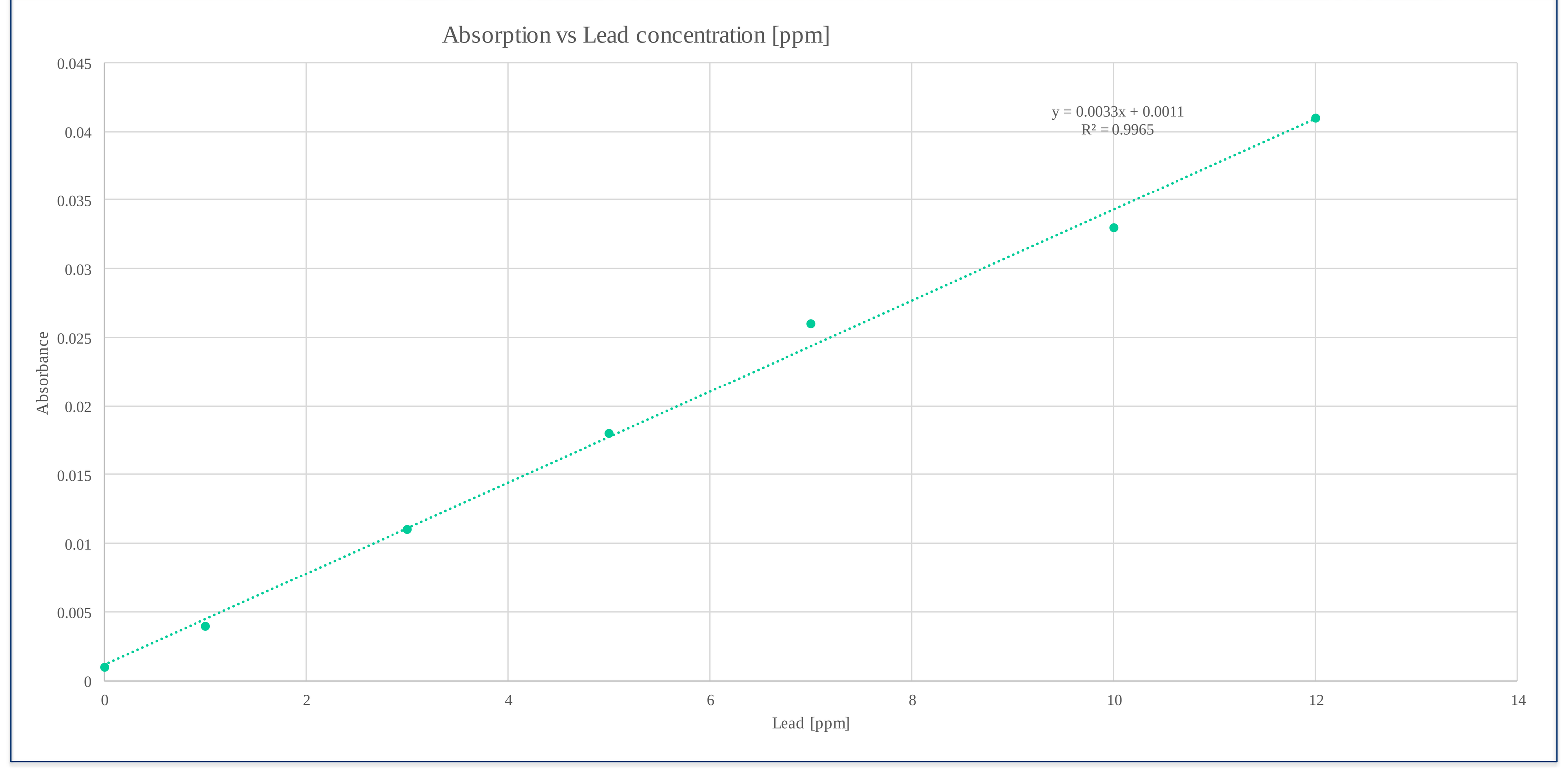
The soil samples were collected from various areas within the community garden to investigate contamination plumes. The analysis was performed with compliance of EPA 3050a - Acid digestion of Soil Samples. AAS (Atomic Absorption Spectrometry) was utilized for digested sample analysis. Knowing the lead concentration would help us to determine the plant species that are suitable for lead phytoremediation. The urban garden has already raised beds in certain areas and utilizes sunflower sunflowers as phytoremediators. The vegetables accumulate lead, especially root vegetables. To prevent the accumulation the rotation of vegetable crops and hyperaccumulators was suggested. Hyperaccumulators are plants that accumulates high amount of lead in their biomass such as decorative

Materials and Methods

- **Sampling:** Soil was sampled at Flanner House community garden, Indianapolis.
- **Soil pH:** Use a pH meter or testing kit with calibrated solutions. Analyze the recorded pH values to discern acidity variations, aiding in soil quality assessment and targeted gardening interventions.
- **Digestion of soil samples for AAS:** EPA 3050a, Acid digestion. This digestion process enhances the accessibility of elements for AAS, ensuring accurate measurement of metal concentrations in the soil.
- **Calibration and Analyzing Standards for AAS:** The calibration curve with 0ppm, 1ppm, 3ppm, 5ppm, 7ppm, 10ppm, 12ppm was prepared and the absorbance was measured. The lead concentration was calculated utilizing the best fit trend line from standards.

Sample	Absorbance	ppm [mg/L]	ppm soil [mg/kg dry weight]
Tomatoes (1)	0.005	1.18	127.27
Tomatoes (2)	0.012	3.30	355.70
Tomatoes (3)	0.017	2.70	382.44
Tomatoes (4)	0.008	2.09	225.17
Sunflower (5)	0.006	1.48	159.90
Sunflower (6)	0.006	1.48	159.90
Sunflower (7)	0.007	1.79	192.53
Kale (8)	0.004	0.88	94.64
Kale (9)	0.008	2.09	225.17
Corn (10)	0.004	0.88	94.64
Corn (11)	0.005	1.18	127.27
Callard (12)	0.013	3.61	388.33
Callard (13)	0.009	2.39	257.80





Conclusions

The essential for tracking of contamination plume and phytoremediation design. The lead concentration is increasing toward the kale, and collard garden area. The concentration of lead is moving with underground water flow. The ornamental cabbage will be set up in the area in line rotating with collard and kale to start removing the lead from the soil. The trees will be used to mitigate lead as a barrier between low and high concentrations.

Future Directions

We advance our understanding of lead distribution in the soil through meticulous sample collection and precise analytical techniques. To investigate the long-term effects of lead in soil on plant health and exploring sustainable remediation strategies will be crucial for mitigating environmental risks and promoting ecosystem resilience. To apply- the phytoremediation method in spring In addition, the workshops for citizens to understand lead poisoning and how to prevent it from their gardens.

Literature Cited

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