



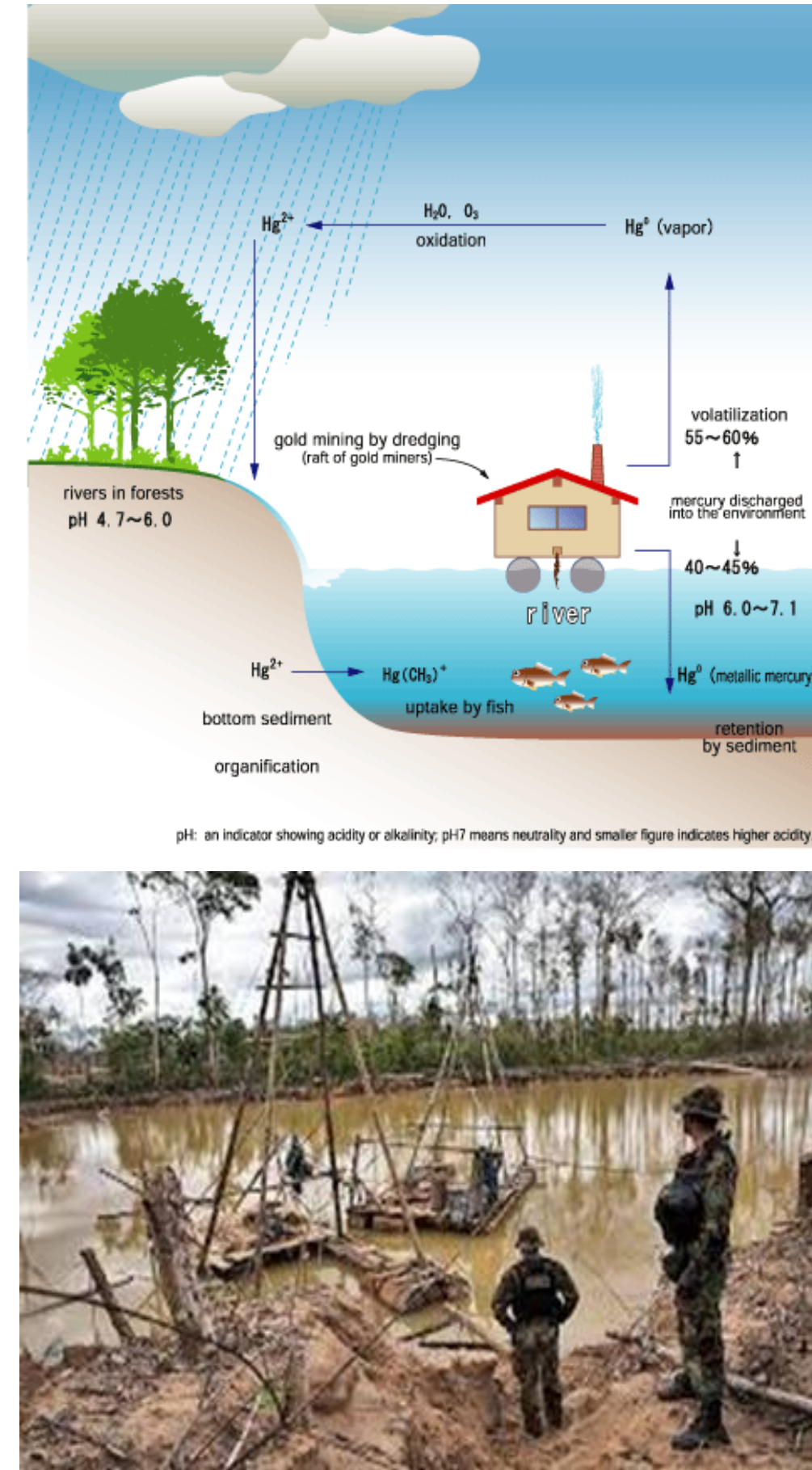
Reforestation in Peru: Effects of Mercury Contamination

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Introduction

The Peruvian Amazon rainforest has serious illegal gold mining problem. The use of mercury (Hg) in artisanal technology has led to an increase in mercury contamination in the natural environment. This has affected the water and vegetation of the Amazon, as well as the people that depend on the environment for survival, by increasing their exposure to mercury poisoning. Similar issues are prevalent in neighboring countries in the Amazon, and other countries like Nigeria. In order to improve reforestation efforts in the Amazon, we want to understand the effects of Mercury contamination in plants. Our hypothesis was that mercury contamination would inhibit plant growth.



Results

Effect of Hg on Radish Weight and Seedling Growth

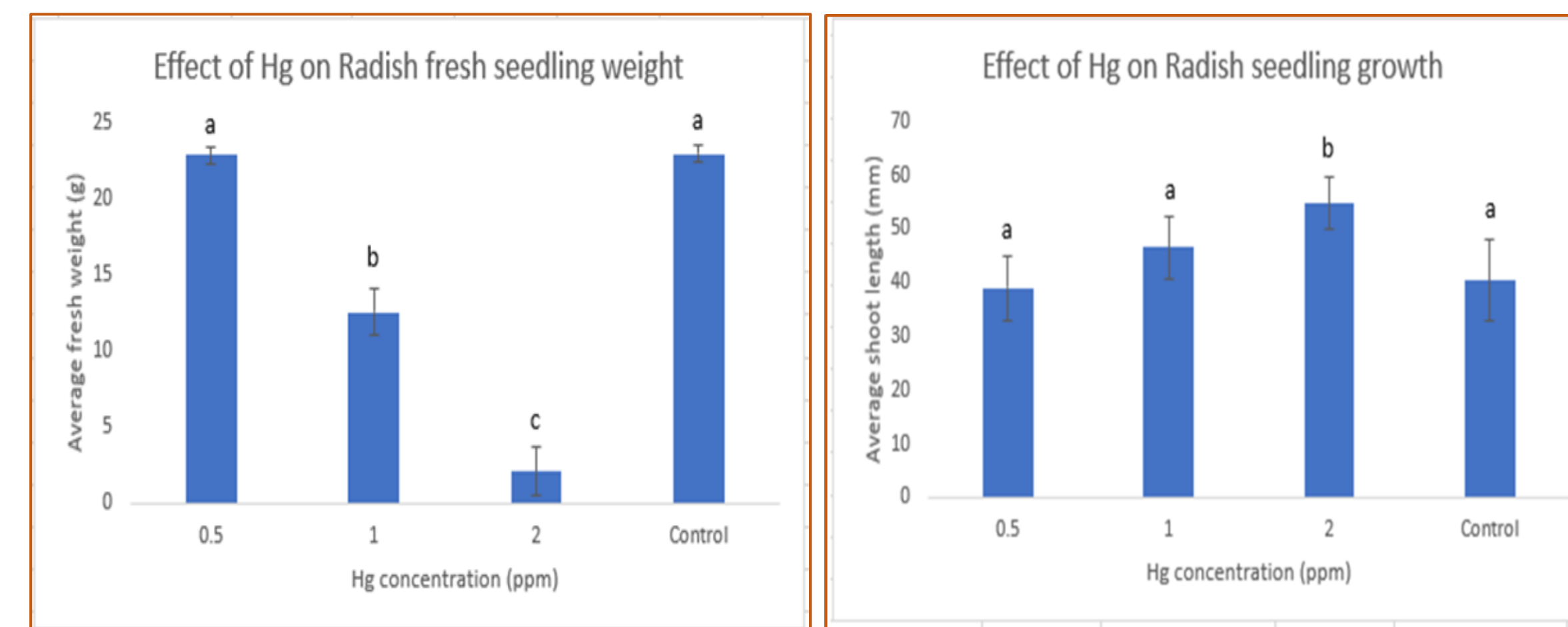


Figure 3. Results from previous experiments using weight as independent variable.

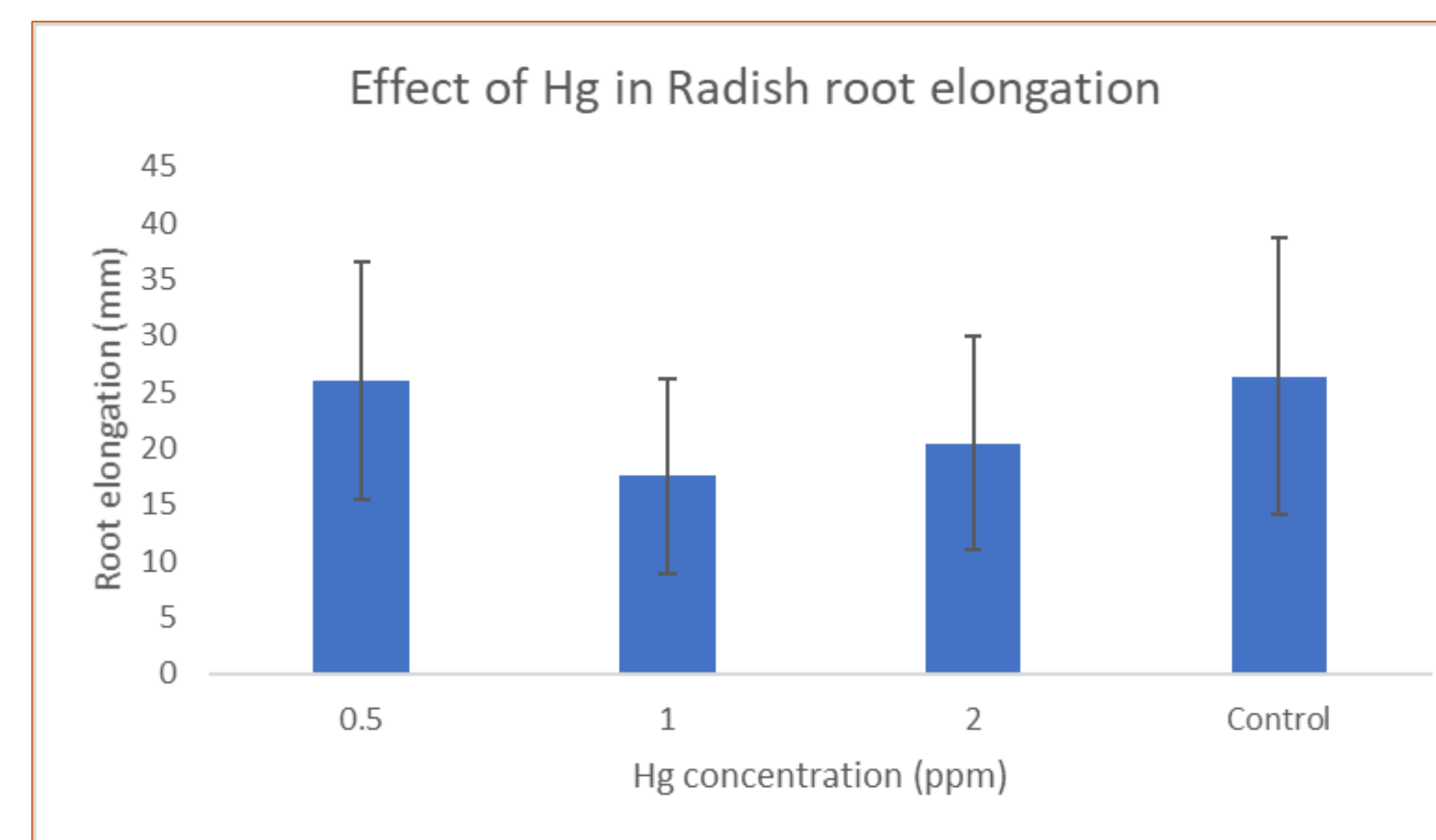


Figure 4. Results from 3-day root elongation experiment on radish seeds.

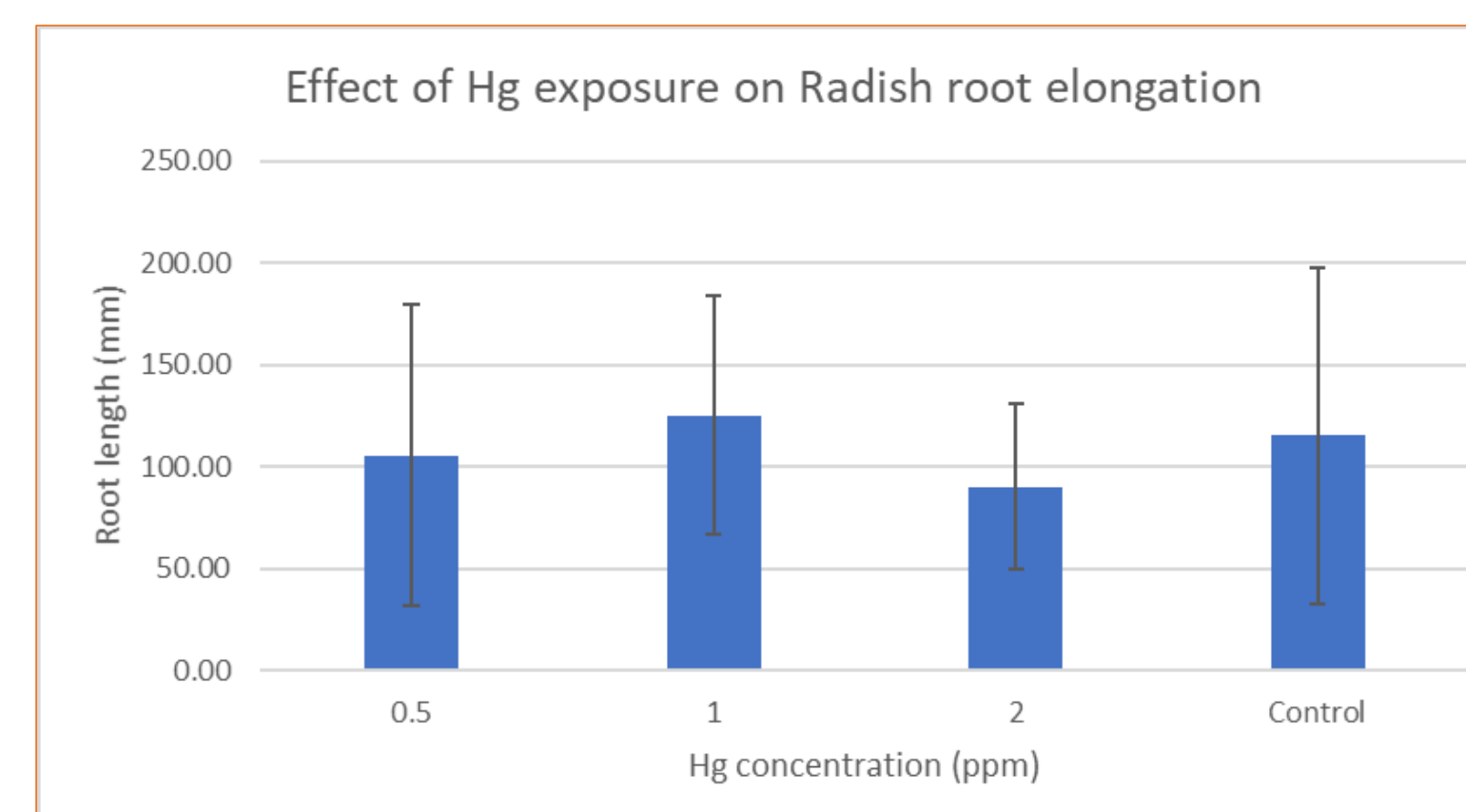
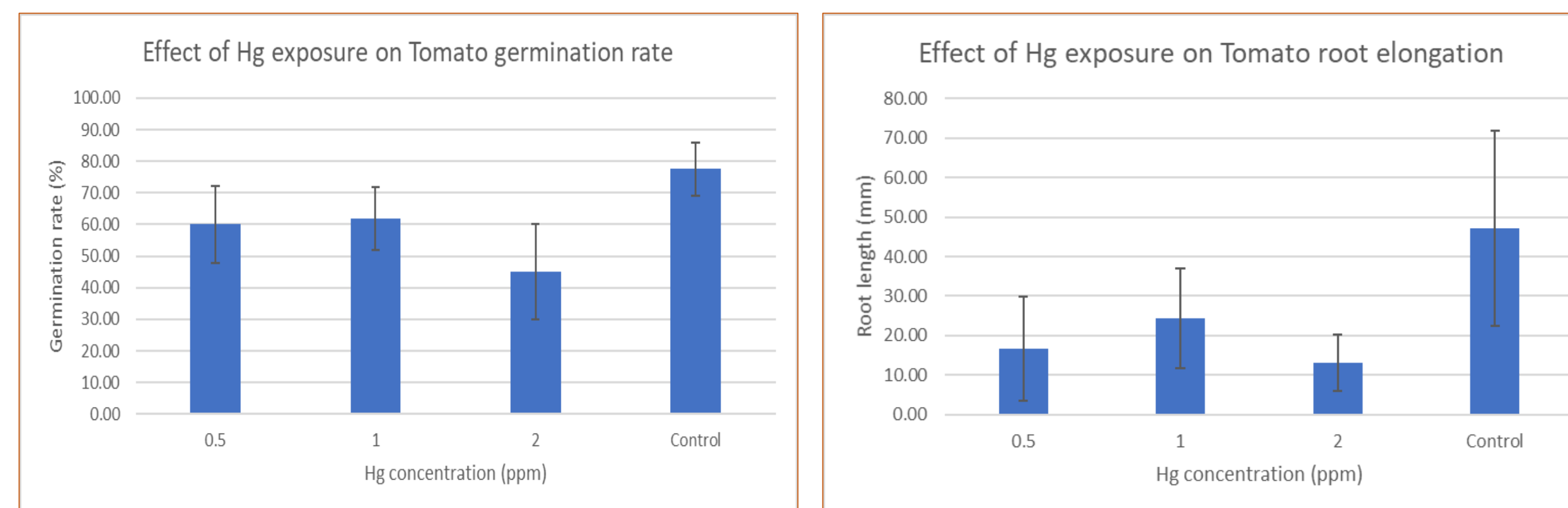


Figure 5. Results from weeklong experiment with tomatoes and radishes.

Conclusion

Statistical analysis (t-tests) was used to our analyze data. The results showed that the seeds from the control group and those exposed to 0.5 ppm of mercury had greater root elongation than those exposed to 1 and 2ppm, after three days of germination in radishes. For the tomatoes tested in a weeklong experiment, the control group had a significantly higher root length followed by 0.5 and 2ppm. These results showed that 2ppm (the greatest concentration) stunted root elongation the most in radishes and 1ppm stunted root elongation the most in tomatoes. These results also support some of the previous conclusions from experiments done in our lab using pumpkin and lettuce seeds and beans. In these experiments we measured weight, used different concentrations of mercury, and different procedures. 2ppm was consistently the concentration that affects the most the weight and length of the plants, supporting significantly different support the hypothesis and concerns about increasing amounts of mercury deposits in the Amazon rainforest.

Experimental Methods



Figure 1. Left: Placement of parafilm-wrapped petri dishes in growth chamber. They were tilted to promote root elongation. Right: Resulting dish of radish seeds, after three days.



Figure 2. Left: Tangled radish plants, prior to measuring. Right: Lab table setup for measuring roots after germination.

Tomato and radish seeds were used to test the effects of mercury contamination on root elongation.

- 1) 16 Petri dishes were used per seed-type per experiment. Each dish was labeled according to plant type, concentration of mercury, and replication number. e.g. T-2-1: tomato, 2ppm, 1st replication.
- 2) 10 seeds were placed in each dish. Then treated with 4 mL of a water and mercury solution that was 0 (control group), 0.5, 1, or 2ppm of mercury.
- 3) Dishes were wrapped in parafilm and place on a tilt in the growth chamber, which was about 22°C. Some experiments were three days, while others lasted a week.
- 4) Roots were measured using engineering scales, and results recorded.

Future Work

The future direction is to travel to the Peruvian Amazon later this year and use these protocols to do testing on multiple indigenous plant species (trees, medicinal plants, and crops) with local research partner NGO CINCIA. This will hopefully give researches more clarity on the effects of mercury contamination in the Amazon, which will hopefully lead to developments on how to reverse these effects and restore parts of the forest.

Acknowledgements

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