Conclusions

This experiment tested local waterways for microplastic pollution. That water was then used to grow soybeans as a way to see if microplastic had a direct effect on agriculture. The hypothesis was that there will be detectable levels of plastic in all water samples collected and plants grown with the least amount of plastic particles in their water source will have noticeably higher growth rates.

Through a multitude of testing and analysis, the hypothesis was shown to be supported. After careful observation, microplastics were detectable in all 7 of the sources. In order to find the microplastics in the water, it was first sieved through three different filters. The particles collected from the sieves were dried, observed and weighed. Then, the water that had gone through the sieves was heated with the addition of hydrogen peroxide to break down any organic material. After the heating process, salt was added give the water a higher density. After the salt was dissolved and the mixture was allowed to sit, plastic was visibly available on the surface of the mixture. The plastic was collected from the top, weighed and observed. Then the weights of the sieving process and the water skimming process were added. Finally, the collective weight was divided by the amount of water that it had started with to get a plastic to water ratio.

Over a period of six weeks, 800 soybeans were grown and studied. The soybeans were observed in sets of 400, each set was grown for three weeks. Within a test of 400 plants, there were 8 subsets, each containing 50 plants, and each watered from a different source. Seven of the subsets were watered with collected water from local streams or creeks, the eighth was watered using distilled water with the hope it would contain less plastic than water from a local waterway. Once the plants had grown for three weeks, they were uprooted and measured. The length and weight of the entire soybean was recorded first, then they were cut at the soil line and the shoot was recorded using length and weight. The same was done for the root. This testing and analysis format was repeated for the second subset to ensure that the results were replicable. It was observed in both the first and second subset, or trial, that the water source that contained the largest amount of microplastics (source 3) had the least soybean germination and the lowest growth rate. The distilled water didn't have particularly exceptional growth rates, but it was observed that the more microplastics present the less likely the soybeans were to germinate or grow with comparable rates to that of uncontaminated water. Although these results were recorded with soybean plants, similar conclusions can be made with other plants.

There were some sources of error in this experiment. Due to equipment limitations, it was difficult to definitively find and quantify microplastics. Despite the limitation, plastics were observed and quantified with relative certainty. In the future, the plants would have been brought to fruition to see how plastic can affect the yield of a plant. Types of plastic would be beneficial to take note of in the future as well. Seeing how mature plants are affected by the presence of plastic will be helpful for putting the dangers of plastic on the environment in perspective.