Zai'onna Currie
Grade 5
Age 10

# Introduction

Raphanus sativus seeds are often used in experiments involving plants and germination because they are fast growing and results can be achieved in a shorter time span. They are more commonly known as the radish. In this investigation however, they are going to tell a story involving the quality of the water used to hydrate and nourish those seeds. Does it make a difference what you water plants with so long as they get some sort of water? Would you get the same results if the seeds were watered with tap, bottled, or even polluted river water? The rain outside falls on everything and even that is a little polluted.

Does the type of water used to nurture Raphanus Sativus seeds have an impact on their germination and plant growth? The purpose of this investigation is to determine if the type of water used: bottled, tap, or polluted urban river water, will have an impact on Raphanus sativus seed germination and plant growth.

I think that bottled water will provide the healthiest, most nutritious source of water for plants because of the intense purification process which removes all the toxins and allows germination and growth.

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# Experimental Design

This investigation was to determine if the type of water used: bottled, tap, or polluted urban river water, would have an impact on Raphanus sativus seed germination and plant growth. Ten samples from each of the three sources of water were used for the investigation. A control group of ten samples was watered using snow melt as this is the most naturally occurring water in our earth system. Raphanus sativus seeds were used for this research due to its very short growing cycle.

All supplies were gathered and the same protocols were used for each sample in every type of water used. The water used was tested before application, and the gathered data recorded in logbook. Each result was compared to the model for healthy water provided by the DEQ (Department of Environmental Quality). The following parameters were tested: dissolved oxygen, air/water temperatures, nitrates, phosphates, pH, copper, and turbidity. All manufacturer protocols were strictly followed and results recorded for further study. Pertinent data was uploaded to GLOBE.

One Raphanus sativus seed was planted in each peat pot, using the same soil type, and given the same amount of water and sunshine. A calendar log was kept that recorded day of first growth, how many trials germinated in each type, and

measurement of plants once they germinated during this process. There was a total of 150 peat pots and trials for this investigation.

## Materials

The materials used were:

- 1-2 packs Raphanus sativus seeds (common radish)
- 80 pounds of soil
- 150 3-inch peat pots for planting
- Colored sticks for marking trials and substances measured
- 5-gallon bucket of river water
- 2 cases each of: Sam's Club water and Nestle Pure Life, case of snow melt for control plants, tap water
- LaMotte chemical testing kits: Dissolved oxygen, nitrates, pH, phosphates, copper. Go Direct Vernier pH probe, water thermometer, IRT for air temperatures.
- Logbook, printer, Internet supplies, camera for setting up project location

## Results

The results were very interesting. The seeds from the polluted river water (The Ottawa River, Toledo, OH) grew three

plants which quickly died. The other trials with tap water and bottled water grew more slowly and had seedlings in every peat pot. The bottled water samples: Ice Mountain, Nestle Pure Life, and Sam's Club grew more plants but the Sam's Club water was too acidic for them to be very healthy. The tap water plants seemed healthier than the snow melt plants. This completely did not support the hypothesis. The more acidic the pH was, the less growth and early death occurred in the plants.

## Limitations and Real-World Experiences

There are a number of limitations for this investigation. The sample is too small and the timeframe is too short to fully prove or disprove the hypothesis. Further research is necessary to determine this. However, there is enough evidence to suggest that there is value in further researching this topic.

Who would be interested in these results? Farmers, professional plant growers, bottled water producers, city planners who manage the tap water would all be interested in what this type of investigation might reveal. It would affect future food production, growing plants for enjoyment or food, farming in different settings, or managing the type of water given to communities.

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# Conclusion

In conclusion, the data does not support the hypothesis, and for some data points, it does not seem to support anything. However, given the small sample size and the amount of data collected, it seems appropriate to consider further research in this area of interest. For this researcher, there was a lot of plant material to manage and perhaps over time, the results might be more specific. Given the fact that few of the seeds germinated when watered by the Ottawa River in Toledo, Ohio, and that few that germinated, all died, intense study of this river should be considered. Next steps might be to share this data with professionals in the Toledo area who might wish to pursue this venture.

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# Works Cited/References:

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Badges Requested:

Impact:

This research deals with areas of concern for our region. Water pollution and soil/plant growth are of deep concern. Urban rivers have a history of pollution which has been passed on to the soil and plant materials around it. This research was to determine if this was true so that a baseline could be established for further research, possibly finding a solution as more data is gathered.

Data Scientist:

There was certainly a large amount of data gathered during this research. This data benefits a number of projects currently running who can benefit from this gathered data. Past and present limitations were discussed and possible implications covered as well.