Which Water Will Produce the Healthiest Raphanus sativus Plants: Bottled, Tap, or Snow Melt?

#1224

Category: EA
Division: Junior
Science Type Project

Abstract:

- The purpose of this project was to determine if using bottled, tap, or snow melt would produce the healthiest Raphanus sativus (common radish) plants. Snow melt was used as the control since it is a naturally occurring source of water for plants in the environment. Ten trials were run to support the working hypothesis which stated that watering these Raphanus sativus plants with snow melt would produce the healthiest plants because it is naturally occurring and has not been modified nor polluted with animal or human interaction.
- All plants were germinated in peat pots labeled with the water and trial to ensure accuracy of data. All pots received the same amount of water, soil type, and light source. Plant growth was the indicator of health and was measured using a metric rule. Twenty-one days of data was gathered and analyzed. It appeared that the data supported the hypothesis as the snow melt sample grew the steadiest and tallest plants. All plants appeared healthy but reached different levels of growth during the experimental timeframe. It should be noted that the sample size was very small and the time very short. Further research would be necessary to fully support or disprove the hypothesis.

Introduction:

Does it make a difference which kind of water is used to water your plants?

- Water quality is a hot topic in our state. With the quality of many urban water sources under scrutiny, research was necessary to discover what might be healthiest for growing plants ingested by humans. Raphanus sativus (common radish) seeds were chosen for its quick germination and growth cycle.

- The literature suggests that water high in minerals would best be suited for producing the healthiest plants for ingestion. Most research done in this areas has been with a flowering morning glory plant. It was inferred that the bottled water would produce the healthiest plants due to added minerals by the manufacturer.

- The research question presents in the title: Which water will produce the healthiest Raphanus sativus plants: bottled, tap, or snow melt?

Introduction:

- The hypothesis states that watering these Raphanus sativus plants with snow melt will produce the healthiest plants because it is naturally occurring and has not been modified nor polluted with animal or human interaction.

- The purpose of this project was to determine which water source would produce the healthiest plants for human consumption. Most people would use water readily available for watering plants so tap water, bottled water, and snow melt were used to water these common radish plants over a period of one month.

Methods:

Experimental Design and Procedures

- Ten trials were completed for each type of water used.
- All seeds were planted individually in a peat pot with the same amount of Miracle Grow potting soil and were placed in the same area for light and warmth.
- Each plant received the same amount of water. The only difference was the type of water each plant received.
- Daily logs were kept to measure germination, and amount of growth. Pictures and centimeter measurements were taken to determine which plants grew the tallest during the time set for experimentation.
- pH was measured for each water type with a LaMotte pH test kit using strict GLOBE and manufacturer's protocols. This was done to ensure no hidden factors existed in the water.

Methods:

Experimental Design and Procedures

- The data gathered were plant growth and color which were measured by pictures and by centimeter ruler and logged daily for each plant and each trial.

- The time length of the experiment was one month.

- The manipulated variable was the type of water used as all other variables remained unchanged: the soil, light, warmth, and container were exactly the same as was the seed brand and the amount of water each plant was given.

Materials Used:

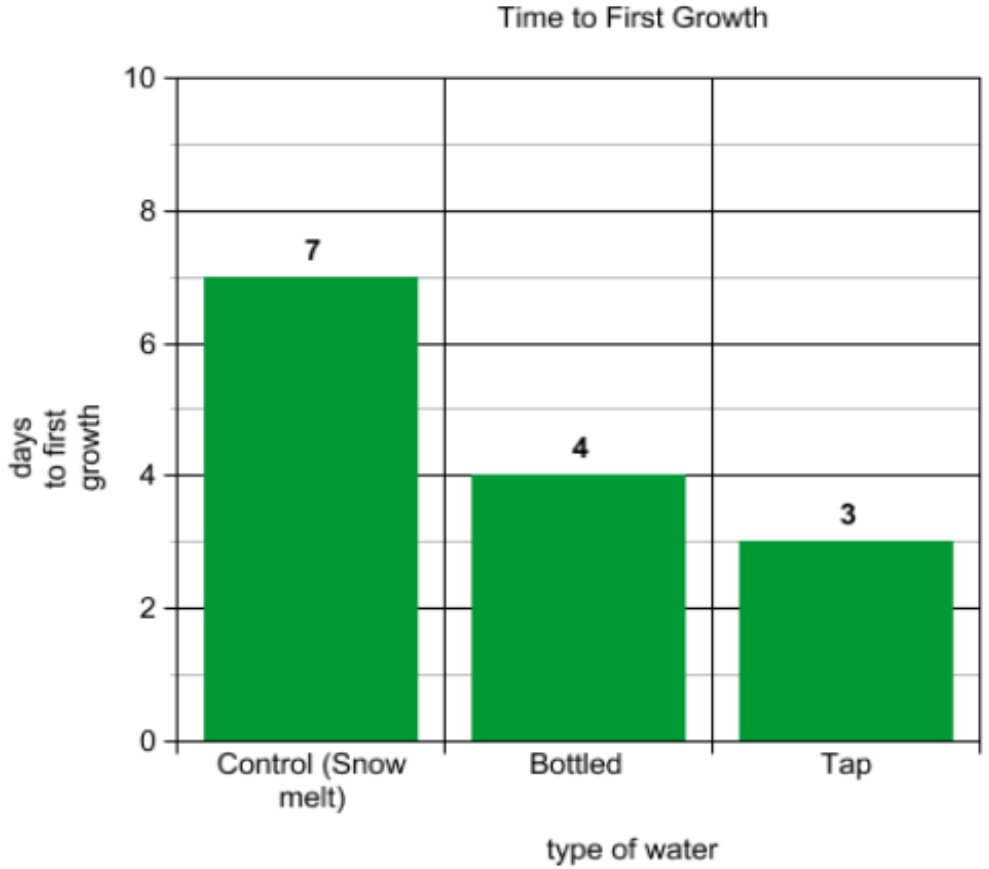
- 30 medium size peat pots
- Miracle Grow potting medium
- Ferry-Morse Raphanus sativus seeds
- Gallon jug of snow melt, gathered from the back yard
- Gallon jug of tap water from the kitchen
- Gallon jug of Ice Mountain bottled water
- LaMotte pH test kit
- Camera, centimeter ruler
- Small spoon for inserting soil
- 1/8 cup for measuring water for each peat pot

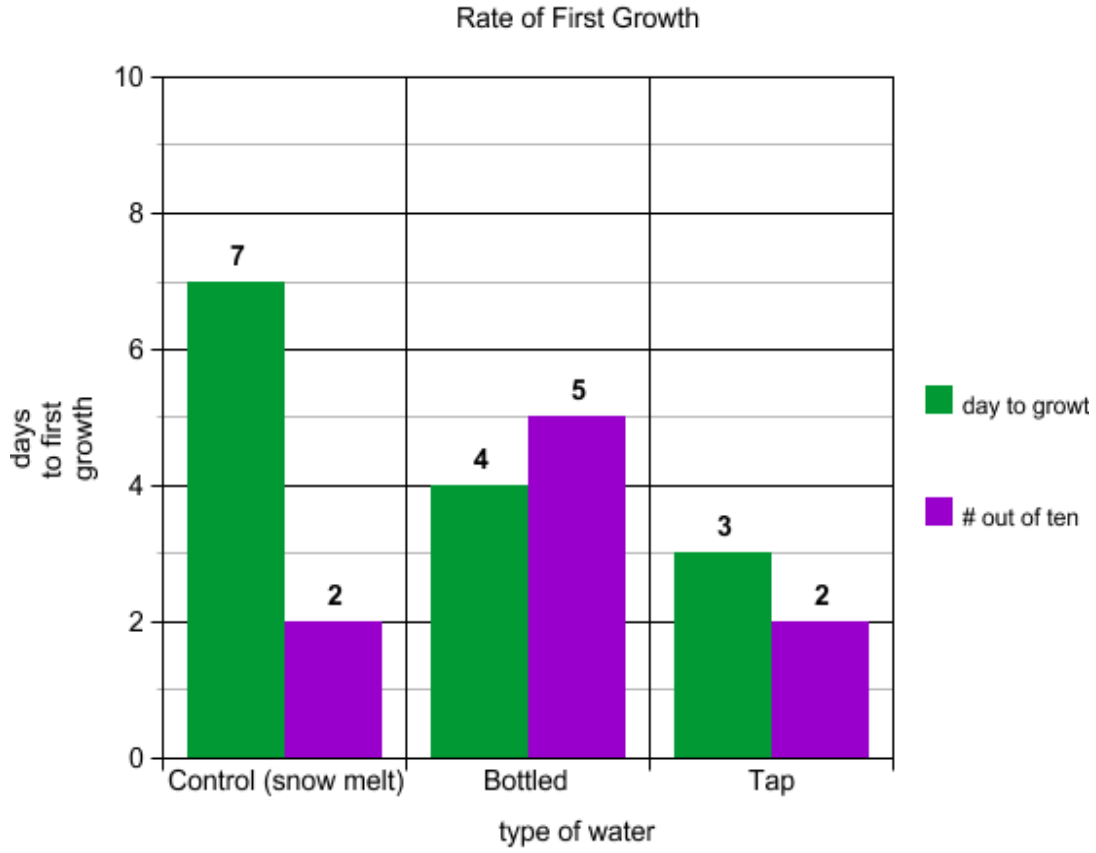
Results:

Bottled Water first growth

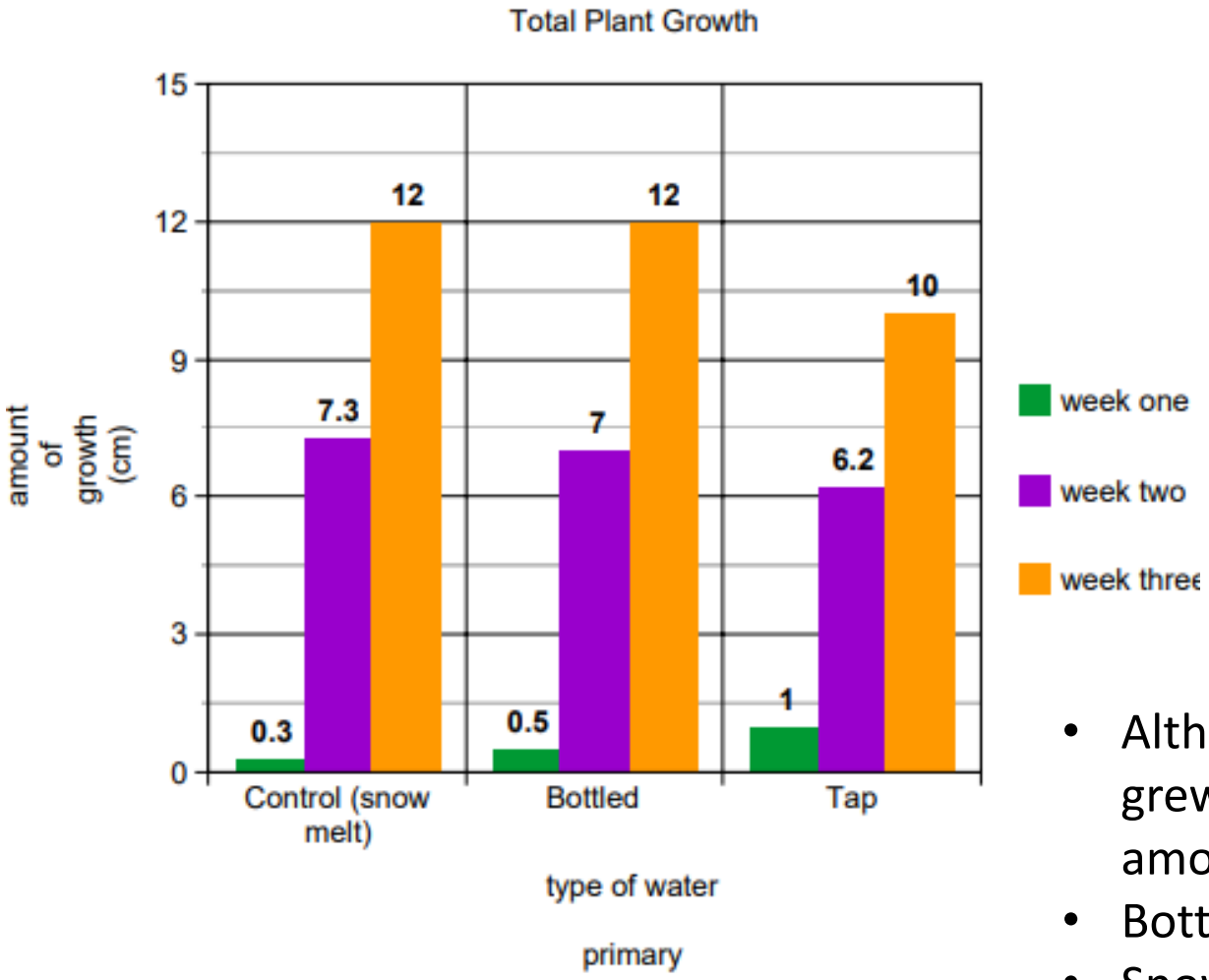
Tap Water first growth

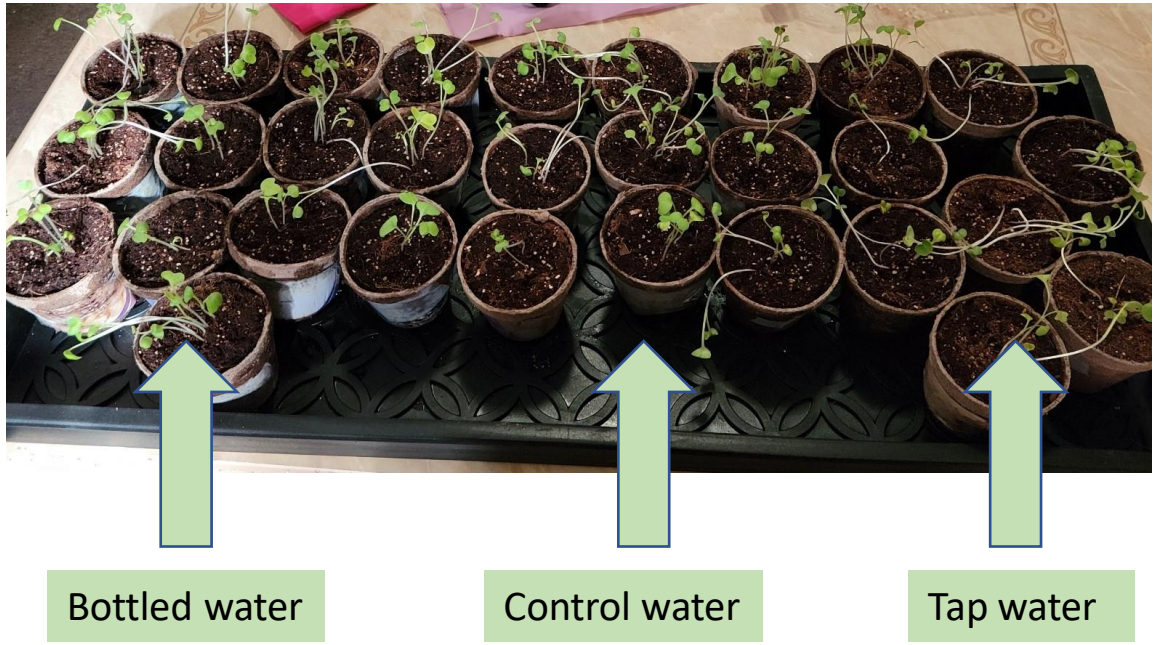
Control Water first growth





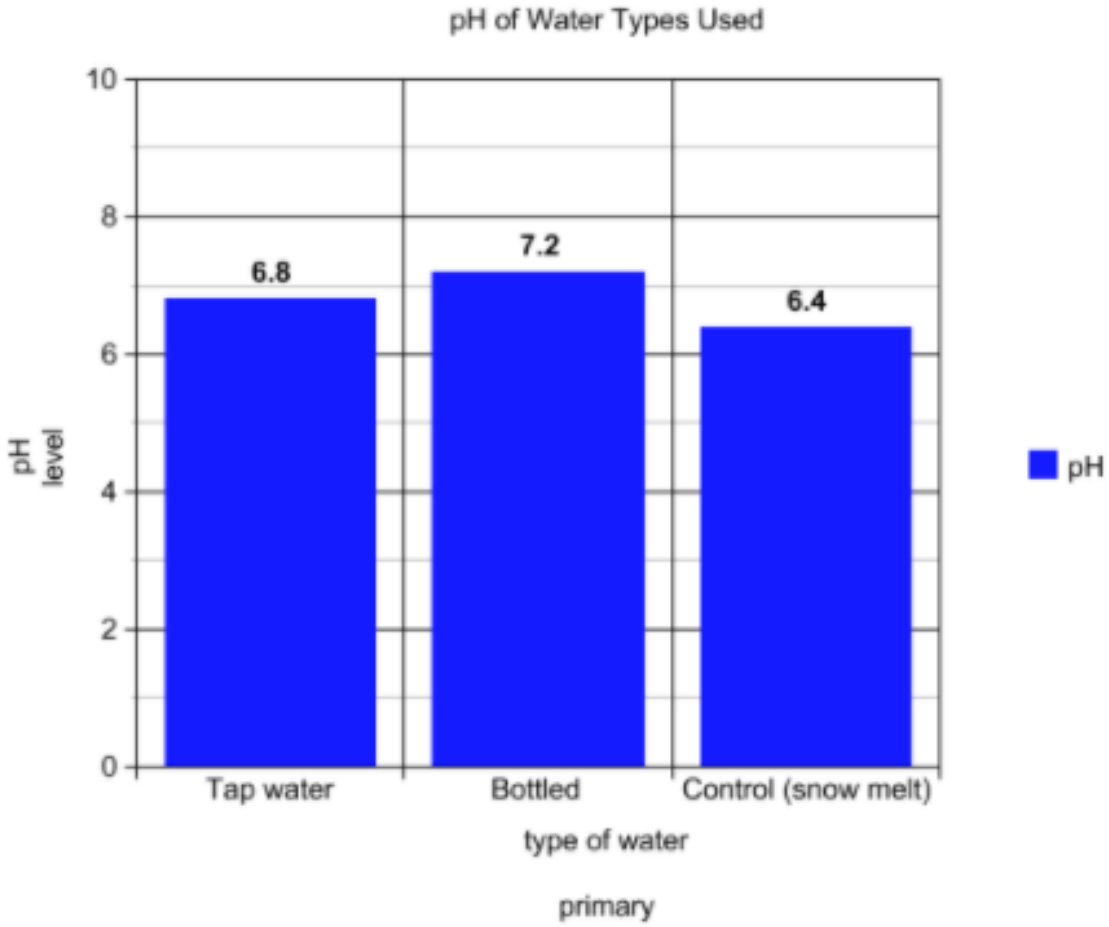
Results: What did I find?





- Although tap water samples were first to emerge, they grew weak and spindly even though they had the same amount of sunlight.
- Bottled water was second to emerge and grew rapidly.
- Snow melt (control) was last to grow but kept a steady rate and matched the bottled water, leaving virtually no difference in size and health.

Results: What did I find?



The pH levels of the water used were fairly close, but the snow melt was a little on the acidic side which was a surprise. I expected it to be more neutral since it was naturally occurring.

Results:

What Did the Data Mean?

- The data appeared to support the hypothesis because the healthiest and tallest Raphanus sativus were the ones watered by snow melt. This was surprising because the literature suggested that the bottled water would produce the healthiest plants because of the added mineral content by manufacturers.

- Nearly all plants appeared above ground around the same time but the snow melt water plants grew the slowest of the three water sources tested. They did reach the same height as the bottled water. The tap water plants were not as strong as the other two water types.

- Most plants appeared healthy in color but the size difference was notable. All plant samples did grow and there were no deaths.

Discussion:

How were the results interpreted?

- Common radishes are hardy vegetables, often considered hard to kill. Yet the final result appears to be dependent upon the type of water the plants received. All other variables remained the same: pot, soil type, sunlight, only the water type was changed. The plants at this time show remarkable differences.
- Literature was in agreement that using bottled water would create healthier plants because of the added mineral content. However, the samples grown here took different routes. The first to appear was tap water but by three weeks, they were becoming spindly and the stems were leaning over.
- The control variable plants were the last to appear but growth was steady although taking longer to achieve the same results as the bottled water. The bottled water came up first and just kept on growing. At this time they are the same height and strength of stem as the snow melt plants are. There appears to be no difference between these two samples.

Discussion:

How were the results interpreted?

- Most of the available data used morning glory plants rather than the common radish (Raphanus sativus). This might account for the differences in growth.
- Extreme cold outside could have affected growth as the windows were not as tightly sealed against the weather as I hoped.
- There were times I had to trust another to water my plants as I was stuck elsewhere during a winter storm. This was also a possible factor in growth.
- None of the plants died and I cannot wait to try eating them for the first time! The package said they would be ready in one month for eating but I think these have grown much slower than that!
- The samples' growth was inconclusive as two of the three types of water produced the same healthy plant.

Conclusions:

What do these results mean in the context of my experiment?

- The data does appear to support my hypothesis for the amount and size of trials. However, it should be noted that many more experiments should be done to fully support this hypothesis. More varieties of seeds, more types of water, and many other variables should be considered.
- Using a different type of bottled water could produce different results. It is not possible to determine this based on the small amount of samples and trials that I ran.
- I expected to see better growth from the tap water than was evident. It does make one wonder if something might not be so great in the drinking water!

Conclusions:

What do these results mean in the context of my experiment?

- Further research is necessary to fully support this hypothesis!
- It was helpful to have a professional in plants to help establish the basic criteria for this experimental design. I was able to refine my variables and obtain more accurate data.
- Questions were raised concerning the results: would they be different if I had used a different type of seed? Would a different type of radish still produce the same results?
- Moving forward, it would seem another set of seeds might be an interesting way to search out these answers!

References

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