GROWTH DEVELOPMENT OF PLANTS

THIS EXPERIMENT, CONDUCTED BY THREE HIGH SCHOOL STUDENTS, AIMED TO INVESTIGATE THE DIFFERENCES IN GROWTH DEVELOPMENT OF PLANTS.

THESE RESULTS WERE DEPENDANT ON DIFFERENT LIQUIDS BEING APPLIED TO PLANTS. BLACK COFFEE, SALT, TAP AND LAKE WATER WERE ALL SEPARATELY WATERED TO DIFFERENT PLANTS OVER THE COURSE OF 3 WEEKS, TO ACHIEVE A COMPREHENSIVE UNDERSTANDING OF WHICH LIQUID IS THE MOST EFFECTIVE IN STIMULATING PLANT GROWTH.

MINIMAL PRIOR RESEARCH WAS CONDUCTED, SUCH AS THE PROCESS OF HOW PLANTS REACT TO SALT.

AIM

The aim of this experiment was to determine the differences in the height of plants, dependent on different liquid variables. The aim was to determine which liquid is most effective in stimulating plant growth.

HYPOTHESIS

It was theorised that the plants watered with lake water would grow the tallest. This was because lake water has higher levels of nutrients when compared to its counterparts: black coffee, tap water and salt water.

It was also expected that the plants watered with salt water would fail to thrive. This was because salt causes the viscosity of the water inside and outside the plant to fluctuate. Subsequently, the plant loses the water needed to transport nutrients across the entirety of the plant. The plant essentially becomes desiccated, before dying.[1]

This process (osmosis) was the reason why the salt watered plants were expected to grow the least effectively.

MATERIALS

Five different types of seeds (tomato Burnley Surecrop; wheat; pea willow; onion Gladalan Brown; dwarf bean). 20 seeds per type.

Four different types of liquid (black coffee – no milk; tap water; lake water; 3.5% concentration salt water)

14 cubic litres of soil

Four separate plant pots

Ruler

METHOD

01.
Four pots were filled with 3.5 cubic litres of soil each.

02.
Five seeds of the same type were added in a pot each. This step was repeated for the other types of seeds.

03.
Each liquid was carefully applied to the seeds each day. They were equally watered once a day, then twice a day after germination. Germination is when the plant sprouts from the seed. Approximately 100ml of liquid was sprayed upon the plants each time.

04.
All the plants experienced the same 10 hours of sunlight per day. The plants were not kept outside overnight, to prevent frostbite.

05.
The height of the plants was measured every week (7 days) and the results were recorded in a table.
The results were collated at the end of the 3 weeks (21 days).

Pictured above is an image of the black coffee watered plants at 14 days (left). There are also two images of both lake watered plants (top) and salt watered plants (bottom) at 21 days.

ANALYSIS

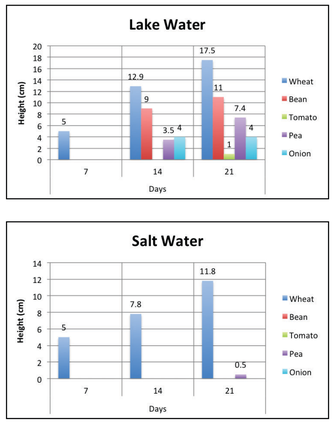
The data displayed to the right provides insight into how different plants grow depending on what liquid they are watered with.

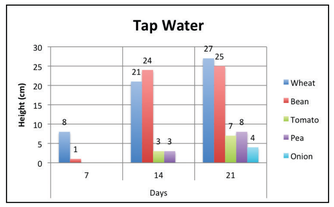
The graph displaying the average plant growth shows that black coffee was the most effective liquid in terms of stimulating plant height. At 21 days, the plants watered with black coffee reached an average height of 15.6cm, compared to those watered with tap water at 14.2cm, lake water at 8.18cm and salt water at 2.46cm. This trend was repeated at the 14-day mark. At 7 days the plants watered with tap water reached an average height taller than plants watered with black coffee. This minor increase in growth does not change the fact that plants watered with black coffee were taller on average. The majority of the graphs support this. These figures indicate that black coffee was the most effective liquid in this experiment.

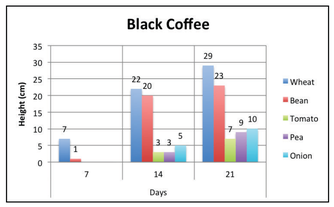
This data contradicts the hypothesis, which states that lake water would be the most effective liquid to stimulate plant growth. Additional research into why the nutrients from the lake water did not surpass that of tap water, would provide further understanding of the effect of the different liquids on plant growth.

The data proves the salt-water hypothesis. In the majority of the graphs, salt-watered plants had the lowest rate of growth. The quality of this data was considered. The plants were measured as accurately as possible; yet there is still a possibility the results may be compromised due to human error.

The data does not give any indication of the quality of the plant produce. Waiting longer than 3 weeks and determining the produce quality could have improved this experiment. This could be used to determine which liquid has the most impact on plant growth to a higher accuracy.

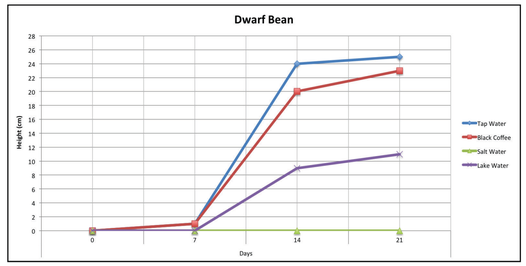




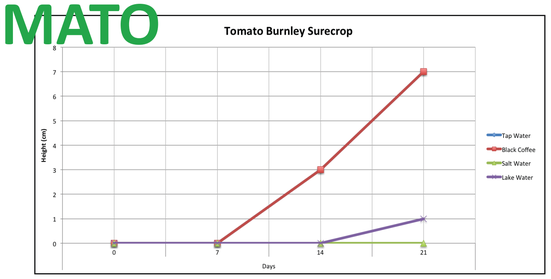


WHEAT

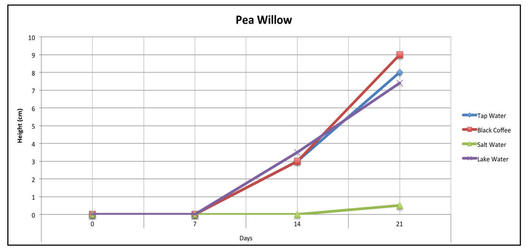
DWARF BEAN



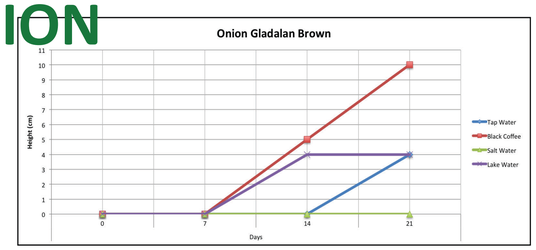
TOMATO



PEA WILLOW



ONION



GRAPHS EXPLAINED

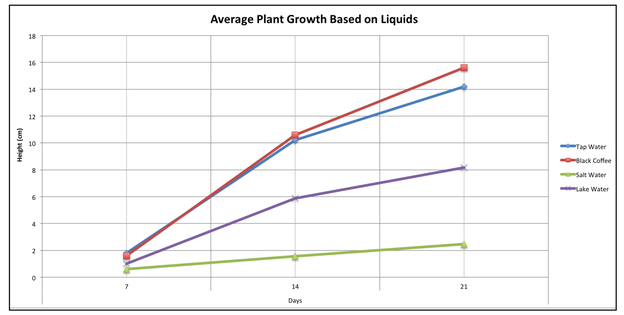
The results in all graphs are presented in 7 day intervals. This means data was only collected every 7 days, not every day.

Tap water and black coffee got equal results in the Tomato Burnley Surecrop experiment, meaning tap water is not visible on the graph because it is hidden behind the coffee results.

In the bar column graphs, the heights of the plants are recorded above their individual bar. Where results are not present, the plant grew 0cm during that week.

The average growth graph collects all the data for each individual liquid over the course of 3 weeks. In week 1, every plant that was watered with black coffee for example, has its heights added up and the mean is calculated. This process is repeated for all of the other liquids, through to week 3. The end result is a graph representing the average growth effectiveness for all of the liquids.

AVERAGE GROWTH



CONCLUSION

Based on the evidence presented from this study, it is clear that black coffee is the most effective liquid for plant growth during the first 21 days of development. Plants watered with black coffee were the tallest on average. It is also clear that salt water is the least effective liquid on plant growth, as the plants watered with salt water were the shortest. Further research into why lake water did not surpass tap water, would provide a better understanding into how different liquids can effect plant growth.

BIBLIOGRAPHY / REFERENCE

1. Etomica, 2016. The Effects of Osmosis. [online] Available at: <http://www.etomica.org/app/modules/sites/Osmosis_old/Background1.html> [Accessed 4 Oct. 2016].

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