

Germination lab experiment essay sample



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Introduction

In this experiment we will be focusing on the factors, which influence the process of germination of a plant. Germination is the process when a seed sprouts from dormancy. The seeds are placed in soil or in any type of wet paper towel. It is basically the development of a seedling to a seed. The optimal germination pH is between 6 and 7.5. The cotyledons store food for the baby plant inside the seed. There are a few basic steps, which take place during germination

1. The seed absorbs water until it swells and smoothens its exterior wrinkles.
2. The seed then swells until the coat of the seed is ready to burst open.
3. The food, which was stored in the cotyledons or endosperm, soaks up water and the substances dissolved in it.
4. The enzymes then absorb the stored food and respiration begins. Energy and raw materials are gained through food for cell division and growth.
5. Then the radical appears, after which the plumule appears.
6. The seedlings then gain fresh weight through absorbing more water and thus lose dry weight. This continues until enough leaves get matured to produce through photosynthesis faster than it is used for growth.

In this picture you can see the process of germination

Requirements for the process of germination:

Water – It is required to make the seed burst and break the seed coat and it is also needed to moisten the seed.

Oxygen – It provides the seed with metabolism.

Temperature – It effects the growth rate and cellular metabolic.

Light or darkness- needed for growth and energy.

Aim

To answer the research question.

Research question

How does the change in salinity affect the process of germination of a seed?

Hypothesis

In my view the more the concentrated salt solution is used the less amount of seeds will be germinated. From my previous knowledge of the process of osmosis, I have made this conclusion. Osmosis is the movement of water particles from an area of high concentration to an area of low concentration. In the case where the water outside the seed is more saline means solution is hypertonic (Less concentration of water then the seed), water diffuses out of the seed causing the seed to shrivel and die. On the other hand, if outside solution is hypotonic (More concentration of water then the seed), water will diffuse into the seed causing it to germinate.

Materials:

* 40 Cress seeds

* Pure Water

* 4 Petri dishes

* 30 ml of 16% solution

* Measuring beakers

Variables:

Controlled variable: Amount of seeds, temperature, amount of water, oxygen and sunlight

Independent variable: Amount of salt solution

Dependant variable: Rate of germination

Methods:

1. First take out all the materials and place them on a desk.
2. Then take a cotton piece and place them inside the Petri dishes. Note: Be careful not to place too much cotton or way too less.
3. Then measure a suitable amount of water with the help of a measuring beaker and place them in all 4 Petri dishes. Be sure to place the same amount of water in all 4 Petri dishes.
4. Now in this step we need to place the following listed solution in one of the Petri dishes

5 ml of 16% solution

10 ml of 16% solution

15 ml of 16% salt solution

5. Now one of them does not have a salt solution this is the controlled part of the experiment. This will help you draw conclusions in a much easier way as then we can see the normal process of germination in comparison to when salinity is implied.

6. Once you are finished with the applying of salt solution and water part of the experiment you will place 10 cress seeds in each Petri dish. The amount of grains can be different as long as the same amount is kept the same for all 4 Petri dishes.

8. After which place Petri dishes in the sun so the process germination can take place.

9. Place the lid on the Petri dishes so that no liquid escapes the container through the process of evaporation this makes our experiment more accurate.

10. Now observe the growth of the plant for the next 5 days and it might take a few days for germination so don't worry if they haven't germinated in a night.

End result

However none of the seeds germinated so there was some default in the experiment. We put way too much water in the Petri dishes. But later I personally took the time to do the experiment again and this time I did not place that much water. However there were a few things I changed but the concept and the focus on the factor of salinity remained the same.

My aim and hypothesis is the same however a few of the materials have changed since some things were not available to me so I replaced them with other things.

Materials:

- * Distilled water

- * Table salt

- * Measuring cup

- * Teaspoon

- * Small cup (for salt)

- * Plastic cup or bottles

- * 4 Petri dishes or bowls

- * 40 Mung beans

- * Tweezers

Variables:

Controlled variables: temperature, number of mung beans, amount of outside water or solution, sunlight, oxygen.

Dependent variables: rate of germination

Independent variables: The amount of salt concentration

Methods

1. Preparing Salt solutions:

* Measure salt required into a cup on scales

* Then Add the salt to the amount of measured volume of water

Salt concentration (c)

(By weight)

Grams of salt to add (s)

250ml

Tap

0g

0. 25%

0. 6g

0. 50%

1. 3g

0. 75%

1. 9g

Amount of salt to add (in grams) to demineralised water (in millimeters) for various salt solutions.

2. Preparing a Petri dish or bowl

* Take cotton or a sheet of paper towel

* Cut out a circle shape enough to fit in the bowl or Petri dish chosen

* Do that 4 times and place the cut outs in each bowl or Petri dish

3. Labeling- Add a label on each bowl or Petri dish stating the amount of salt concentration which will be placed, which are 0. 25 %, 0. 5 %, 0. 75% and tap

4. Adding mung beans

* Count out 10 beans out of the pile of mung beans. Hint: Use a flat surface or a thin piece of cardboard to count and separate the beans quickly.

* Now carefully pick up the 10 mung beans with the help of a tweezers and place inside bowl or Petri dish

* Space the beans evenly apart on cotton or paper towel

5. Store the bowl or Petri dish in a well-lit area without way too much sun to avoid the towel drying out and place a plate over the or cap on the bowl or Petri dish to prevent loss of water.

6. Observe daily for the next 5 days. Note: move dishes to make sure that the beans do roll around and separate any beans that have rolled into each other after moving.

Rate of germination of Mung seeds with different concentrations of salt solution in 5 days

Discussion:

This graph helps us visualize the information we have on the table. Our results show that the speed of growth decreases as the more salt concentration is added. It also makes us aware of the fact that the main growth only takes place up to the third day after that there isn't much growth. The germination, which was progressing with the fastest speed amongst all 4 tests, was the control experiment that contained only pure water. However two of the concentrated solutions of 0.25% and 0.50% were able to germinate all 10 of the seeds. But the bowl with 0.75% of salt concentration germinated only 2 seeds in the end out of 10 seeds that is extremely less; it was also one of the slowest in the process of germination.

Conclusion:

From the discussion we can conclude that the more concentrated the solutions were, the lower speed of germination took place. We can also hereby assume that after the concentration of 0.75% even less seeds would germinate. Salinity reduces the substrate water potential there by restricting water and nutrient uptake by the seed. It may also cause toxicity and imbalance. Salinity is one of the environmental factors that have a critical

influence on the germination of the seeds. The presence of salt inhibits the seeds ability to absorb water for germination thus the seed would not be able to germinate and die. My hypothesis was right up to and extent however the salt concentration was not more than the water so it was an hypotonic solution that is why none of the seeds dried up but we could observe that the amount of seeds germinated were less therefore we can be sure that if we increase the salt concentration a bit more such that the water concentration is less than the salt concentration that the seeds will die.

Evaluation:

In over all, I feel that this experiment went well even though I made a mistake by placing way too much water, which was a problem I was able to solve it and able to get accurate results which brought me to the right conclusion. There were many things, which I did to ensure that this experiment could be accurate as possible such as-

- * Placing a lid on the on the bowl to prevent any loss of water through evaporation so that we could be sure that the seed was absorbing everything that was given to it.
- * Picking up the seeds with tweezers to prevent any internal or external damage to the seed.
- * Using a controlled experiment to be able to come up with better results.
- * Checking the plant on a regular basis to make sure experiment is working properly.

* Spreading the seeds far apart so they have space to grow and won't end up being way too close to each other which would limit the space for growth not giving us reliable results.

* Using a measuring beaker while measuring and not just assuming the measurements.

There was however one thing that I could do next time to get even a better understanding of the experiment is use even more different amount of salt concentrations so then I would have had even a wider range of data to understand from.

Follow up experiment:

After this experiment we can continue it with another experiment where we can focus on another factor which influences germination such as the effect of amount of water on germination. In which we can try and place different amounts of water on the seeds and see the difference.

Bibliography

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