Biology Lab Report

Seed Germination

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(Figure One: Cress Seed Germination)

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Introduction

This term, we embarked upon our first biology experiment. Recently, in class, we have been learning about plant reproduction. Amongst the vast amount of information pertaining to the topic of plant reproduction is germination. Germination is the process of sprouting, whereby seeds or spores sprout or emerge and begin to grow. [1] [2] When a seed is germinating, certain factors affect its germination. It was our task to come up with two variables that could influence seed germination and to investigate this. After much contemplation and consideration, I managed to pinprick what factors I would like to investigate. I will thus investigate if altering the light and temperature of the cress seeds' environment will affect the germination.

Research Question

How do light and temperature affect the germination of a cress seed?

Hypothesis

If cress seeds are placed in a dark environment, then their germination will be negatively affected compared to cress seeds grown in a normal light environment because seeds

If cress seeds are placed in an environment with excessive exposure to light, then their germination will be positively affected compared to cress seeds grown in a normal light environment because seeds

If cress seeds are placed in a cold environment, then their germination will be negatively affected compared to cress seeds grown in a normal light environment because seeds

If cress seeds are placed in a hot environment, then their germination will be positively affected compared to cress seeds grown in a normal light environment because seeds

Variables

The independent variables in this experiment were the light and the temperature. We put some of the cress seeds under a bright light and others in a dark cupboard. As for the temperature, we put some cress seeds in a stove and others in a fridge.

The dependent variable in this experiment is the germination. The speed and general process will differ depending on the independent variables.

The controlled variables were the type of seeds and the water. Different seeds obviously germinate at different paces and watering the seeds with different liquids may affect the germination, so to ensure a fair test I want to keep the type of seeds the same.

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Materials

Glassware	Substances	Safety Equipment	Miscellaneous
Measuring Cylinder	Water	Safety Coat	Stove
Petri dish x6	Cress seeds x180		Refrigerator
	Cotton wool		Cupboard
			Lamp
			Labels x6

Method

1. Prepare the area where you will be carrying out your experiment. This entails collecting all the necessary materials and ensuring that you are wearing the adequate safety equipment. Do not forget to label each of the Petri dishes so as not to get confused later.
2. Cover the bottom of the Petri dish with a layer of cotton wool.
3. Sprinkle thirty cress seeds in the Petri dish, on the cotton wool. Water until cotton wool is drenched.
4. Put the lid on. Repeat this for the remaining thre e Petri dishes.
5. Place on dish in a stove, one in a refrigerator, one in a dark cupboard, and one under a bright lamp.
6. Water all seeds regularly.

Control Experiment

This is the method for the control experiment. We chose to make two control experiments. We decided this because we could each monitor one of them and it would also offer additional reliability.

1. Cover the bottom of the Petri dish with a layer of cotton wool.
2. Sprinkle thirty cress seeds in the Petri d ish, on the cotton wool. Water until cotton wool is drenched.
3. Put the lid on. Repeat this for the remaining Petri dish.
4. Place both of the dishes in a regular environment. This means a place with an average room temperature and without extreme light conditions.

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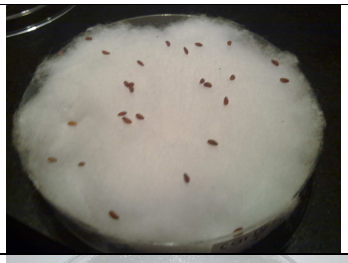
Observations

	Day 1	Day 2
Light		
Dark		
Warm		
Cold		
Control 1		
Control 2		

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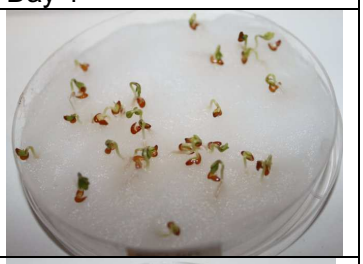
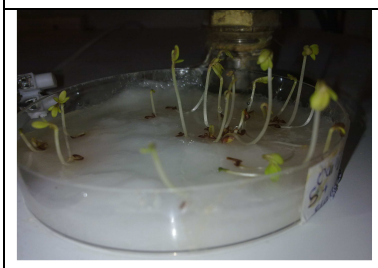
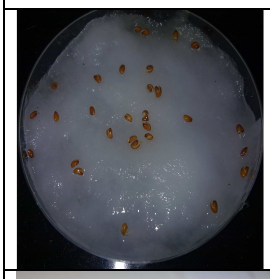
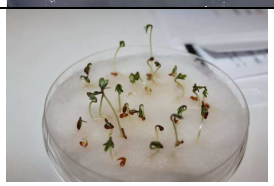
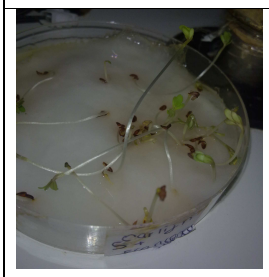
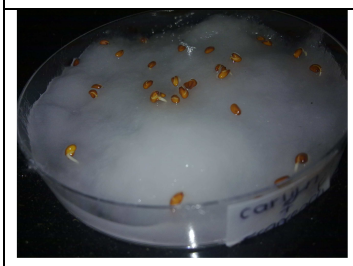
Day 3	Day 4
	
	
	
	
	
	

Day 5	Day 6
	
	
	
	
	
	

Day 7	Day 8
	
	
	
	
	
	

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Day 1	No germination yet	No germination yet	No germination yet	No germination yet	No germination yet	No germination yet
Day 2	Seeds have formed a mucus membrane	Seeds have formed a mucus membrane	Seeds have formed a mucus membrane	Seeds have formed a mucus membrane	Seeds have formed a mucus membrane	Seeds have formed a mucus membrane
Day 3	Small shoots have sprouted	Small shoots have sprouted	Small shoots have sprouted	Small shoots have sprouted	Relatively large shoots have sprouted	Same as Day 2
Day 4	Dark green leaves have formed at the end of the shoots, shoots are growing very quickly	No leaves yet, only continued growth of shoots	Little leaves have formed at the end of the shoots	Little yellow leaves have formed at the end of the shoots	Green leaves have formed at the end of ever-growing shoots	Same as Day 2
Day 5	Some of the shoots are taller than others, there is quite a large difference	They are not standing erect, and there is a large difference of sizes among the seeds	Shoots are now standing erect with dark green leaves	Yellow leaves have formed and the shoots stand erect	Shoots are erect and are still growing	Same as Day 2
Day 6	Same as Day 5 but longer	All seeds have by now germinated, they are standing erect and tall	Same as Day 5 but longer	All seeds have germinated and are sporting long yellow leaved plants	Plants have grown enormously and are no longer standing erect	Same as Day 2
Day 7	Same as Day 6 but longer yet. All seeds have germinated.	Same as Day 6 but a tad longer	Same as Day 6 but longer	Same as Day 6 but longer	The plans have kept on growing but are still no longer erect	Same as Day 2
Day 8	Same as Day 7 but longer, stems are white	Same as Day 7 but longer and the stems are green	White stems, same as Day 7 but longer	White stems, same as Day 7 but longer	The plants have stopped growing and are the same as Day 7	Same as Day 2

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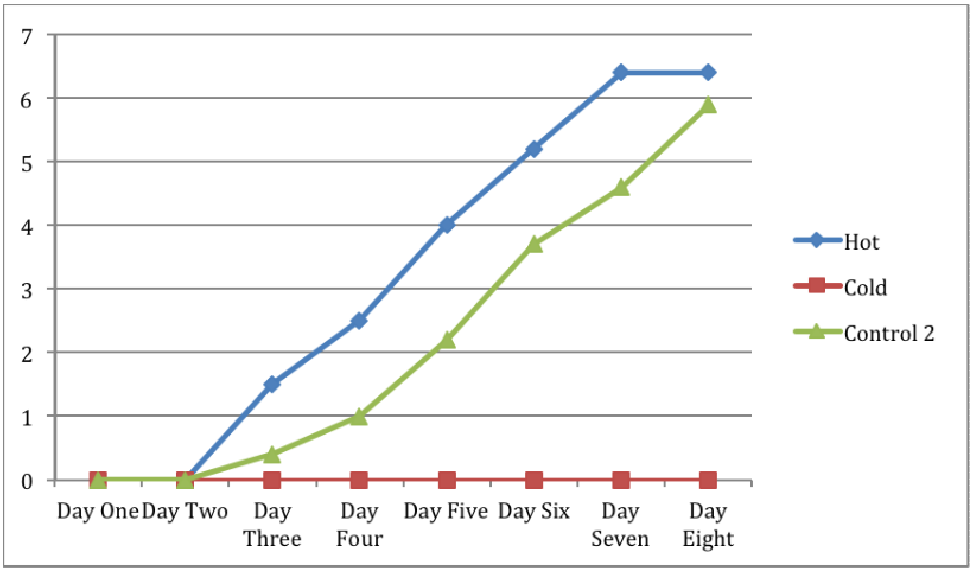
Results in cm, showing average growth of plants

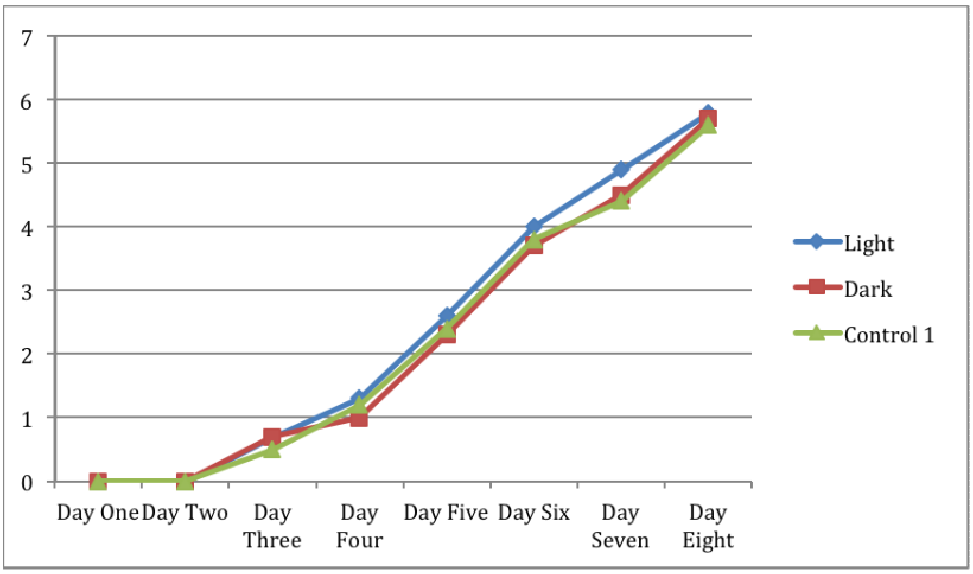
	Control 1	Control 2	Light	Dark	Warm	Cold
Day 1	n/a	n/a	n/a	n/a	n/a	n/a
Day 2	n/a	n/a	n/a	n/a	n/a	n/a
Day 3	0.5	0.4	0.7	0.7	1.5	n/a
Day 4	1.2	1	1.3	1	2.5	n/a
Day 5	2.4	2.2	2.6	2.3	4	n/a
Day 6	3.8	3.7	4	3.7	5.2	n/a
Day 7	4.4	4.6	4.9	4.5	6.4	n/a
Day 8	5.6	5.9	5.8	5.7	6.4	n/a

Data Manipulation



Analysis of Graph One

In this graph we can clearly see what happened to the seeds. It is obvious that the seeds in a hot environment grew the fastest and perhaps the best. In the graph, one can also see that the cress seeds in a hot environment perhaps reached their limit. I can recollect this fr om the graph because the very last part of the blue line does not escalate anymore; it is a straight horizontal line. The control seeds fluctuated a bit in the beginning but the overall pattern is steadily upwards. The seeds in a cold environment did not even germinate. This can be collected from the graph due to the lack of a slope in the red line.



Analysis of Graph Two

The results of this experiment are a lot closer than the ones shown in the first graph. The seeds that germi nated in the light grew faster and a bit taller than the other two. This is evident because the blue line has a steeper slope than the red and green line. The seeds that germinated in the dark grew practically as fast and tall as the control seeds. This ca n be collected from the graph because of the proximity of the red an green line, the lines sometimes overlap.

Discussion

Conclusion

Light Experiment

I will conclude each experiment separately as they were, in fact, separate experiments. Upon testing the variable of light, it has become apparent that seeds germinate more quickly in the light. My hypothesis on this was correct. Although the difference is small, the seeds that germinated in the dark grew slightly slower than the control experiment. In answe r to my research question, seeds placed in light will grow faster. Although a seed can germinate in the dark, once it has germinated it needs light. It is necessary because plants need photosynthesis to convert water and carbon dioxide into sugar, which is food for a plant. [3]

Temperature Experiment

Upon testing the variable of temperature, it has become clear that cress seeds germinate much more quickly in a warmer climate. My hypothesis was thus correct. There is a massive difference between the seeds p laced in cold and the seeds placed in heat. The ones placed in the cold did not even germinate. In answer to my research question, temperature does affect germination. When placed in heat, cress seeds will germinate much more

quickly. Temperature affects growth rates because it affects the cellular metabolic. Temperatures in which seeds will germinate vary greatly. The cress seeds that remained in the cold, stayed dormant and the heat alleviated that dormancy. [4]

Evaluation

I believe that my results are quite reliable. All controlled variables were kept controlled and so an unfair test would be unusual. If I were to carry out this experiment again, I would end up with the same results. That is how I know it is reliable. Another factor that ensures reliability is that multiple cress seeds were planted so it could not just have been a fluke. For these reasons, I believe that my results are reliable.

I also believe that my results are quite valid. It is not as if the reason for some of my plants growing faster than others is reliant on something else. The results are well grounded in the logic of plant germination. It is justifiable with an adequate scientific explanation and thus I believe my results are valid to the fullest extent.

Naturally, there are improvements that could be made to the experiment. If I were to execute this experiment again, I would monitor the seeds more often. Sometimes when I would come back to my seeds the next day, they would look enormously different to the day before. In the time in between these two steps, a lot could have happened. In this way, I feel that I have missed out on some crucial steps. Other than that, I am quite pleased with my results and the overall experiment. I have learned a lot throughout the entire process.

Works Cited

[1] (Figure One) "The Seed Biology Place - Endosperm Weakening." *The Seed Biology Place - The Seed Biology Place*. 12 Mar. 2005. Web. 23 Nov. 2010. <http://www.seedbiology.de/weakening.asp>.

[2] "Germination | Define Germination at Dictionary.com." *Dictionary.com | Find the Meanings and Definitions of Words at Dictionary.com* . Web. 23 Nov. 2010. <http://dictionary.reference.com/browse/germination>.

[3] "Germination." *Wikipedia, the Free Encyclopedia*. Web. 23 Nov. 2010. <http://en.wikipedia.org/wiki/Germination#Requirements_for_seed_germination>.

[4] "What Do My Seed Need for Good Germination?" *Where Seed Starting Success Begins!* Web. 23 Nov. 2010. <http://www.successwithseed.org/getting-started/368-what-do-my-seed-need-for-good-germination>.

[5] "Germination." *Wikipedia, the Free Encyclopedia*. Wikipedia. Web. 23 Nov. 2010. <http://en.wikipedia.org/wiki/Germination>.