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| For our experiment, we want to test if bigger seeds affect growth performance. Therefore, we will test germination rates between different seed sizes. We will observe which seed size starts to germinate faster than the other seed sizes. We will record the frequency of each seed sizes� germination within the duration of the experimental period. We will also measure the length of radicles, which will become roots, and are essential for plants in absorbance of nutrients that help the plant to grow and survive. We also want to find out if bigger seeds have more knots than smaller seeds. Knots are premature root hairs. They will enable the plant to form roots with a bigger surface area, which will allow for more sufficient transportation and absorption of water and nutrients from its surroundings with a more efficient root system. Nodules, which are the bacteria filled parts of the roots that fixate nitrogen, which is an essential nutrient for the plant.  Since nodules do not form until later, we will not be observing them throughout our experiment. We want to test if the actual stems of the bigger seeds are actually bigger than the smaller seeds. Bigger stems would lead to taller plants. Therefore, the primary stem length will be measured to observe if it is true. To measure plant height, we will plant seeds in soil and observe the height of the plant, from the top of the soil to the top of the pea plant. Furthermore, we will use vermiculite in our study of growth performance. Vermiculite will act as a control and allow the plant to grow naturally without nutrients from the environment. We would also like to explore if the embryos of bigger seeds are actually bigger than that of smaller seeds. However, Professor Lynne Elkin of California State University of Hayward suggests that embryos might "vary in shape and position, but the size is usually fairly small. Unless [one is] dealing with really tiny seeds like those of orchards or poppies, the difference in seed size is mainly a function of the amount of food stored" (Elkin). Therefore, we will not be studying embryo size because we do not believe we would be able to measure the exact embryo size of a pea, since the pea seed is fairly small. Also, we believe that we will not be able to find a valid method to compute the amount of food stored in a seed. We considered using a starch test, but that would only show that seeds have initial nutrients and food stored inside of it. Therefore, all the seeds would have a positive outcome by turning black. So, in our experiment, we will not be using any procedure to test our hypothesis that initial nutrient affects growth performance. The same is for embryo size.  We hope that the information we find in this experiment will help farmers germinate seeds faster. This would also be useful in places like Alaska, which have a very short growing season. We hope that this experiment will give us insight on how to produce bigger and more bountiful plants. This would help farmers grow more crops, which would lead to more food for the hungry. Besides enhancing plant growth, our experiment could reveal ways to harvest and maximize crop yield (Thiel). We hope our experiment will be successful.  ([Intro1](http://docs.google.com/introduction.html))([Intro2](http://docs.google.com/intro2.html))([Intro3](http://docs.google.com/intro3.html))([Intro4](http://docs.google.com/intro4.html))  [[Home](http://docs.google.com/home.html)][[Introduction](http://docs.google.com/introduction.html)][[Hypothesis](http://docs.google.com/hypothesis.html)][[Procedure](http://docs.google.com/procedure.html)][[Data](http://docs.google.com/data.html)][[Conclusions](http://docs.google.com/conclusions.html)][[Bilio/Links](http://docs.google.com/biblio.html)]  [[2002 Projects](http://docs.google.com/AP2002/index.html)][[2001 Projects](http://docs.google.com/index.html)][[2000 Projects](http://docs.google.com/AP2000/index.html)][[1999 Projects](http://docs.google.com/AP99/index.html)][[1998 Projects](http://docs.google.com/AP98/index.html)] |