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| Procedure:  Materials:  Frequency Stabilized He-Ne laser  Polarizer  Analyzer  Pyrex Cuvette  Detector  Digital Volt Meter  Dropper  Graduated Cylinder  Sucrose  Distilled Water  Electronic Balance  Centrifuge  Test tubes  Wheat grass  Thermometer  Fluorescent light tube bulb  Setup:  Buy approximately 1 kilogram of wheat grass that is about 10 days old, or plant the seeds in the same type of soil, under the same conditions for about 10 days.  Note: Select wheat grass that is about the same height in order to reduce the number of variables, and sources of error.  Control group procedure:  The control group will be composed of wheat grass that has not been subjected to any fluctuation in light intensity. It will be used as a starting point to compare the differences among the experimental groups.  1. Take out about 30 grams of wheat grass  2. Place the 30 grams of wheat grass into a juice extractor.  3. Once the wheat grass has been reduced to a liquid state, pour the raw sample into a test tube.  4. Place the test tube into a centrifuge as to separate various particular matters into differentiated layers.  5. Set the centrifuge to 12000 rpm for 15 minutes to precipitate the fiber and other unneeded substances  6. Use a dropper to take out the liquid on the top layer (light brown color) and put it into another test tube.  7. Put this test tube into the centrifuge and repeat step 7 to precipitate the residual matters.  8. Shine the laser through the test tube and use the detector to standardize the amount of light passing through the test tube as to keep the intensity of laser passing through each sample the same.  9. Take out about 5cc of the liquid and put it into pyrex cuvette for analysis. See the ANALYSIS section for further detail.  Experimental groups setup  Use the remaining wheat grass for the experimental groups. These groups will be subjected to different light intensities.  1. Separate the remaining 970 grams of wheat grass into 4 groups A, B, C, D  2. Group A will be placed in a dark room while groups B, C, and D will be exposed to different light intensities.  3. Take about 30 grams of wheat grass from each group every hour and make it into sample as described in Control group procedure for analysis.  4. Record the data after each analysis.  Analysis Protocol (CAUTION: Do NOT directly stare into the laser beam!)  1. Line up the laser with polarizer, pyrex cuvette, analyzer and detector as shown in the picture below. Connect the digital volt meter to the detector output.  2. Turn on the laser to see if all the equipments are lined up. Check and see if the laser beam is shined in the middle of the polarizer, pyrex cuvette, analyzer, and the detector.  3. Creating a dark environment, using cardboard boxes to cover the equipment, especially the detector so that it will not pick up other light sources other than laser.  4. Turn the digital volt meter on to the appropriate position depends on the intensity of laser (ex. DC 20V)  5.Adjust the analyzer so that the maximum intensity of laser beam will pass through and give the digital voltmeter a max reading from the detector.  6. Add an aperture (pin hole) in front of the detector to reduce the amount of light hitting the detector, because the laser beam is too bright that the detector will not be able to detect the differences.  7. Collect Data (must be done in the dark, or else the detector will pick up other light sources)    [[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)]  [[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)] |