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| [Homepage](http://docs.google.com/homepage.htm)  [Introduction](http://docs.google.com/introduction.htm)  [Review of the Literature](http://docs.google.com/research.htm)  [Statement of the Problem](http://docs.google.com/problem.htm)  [Hypothesis](http://docs.google.com/hypothesis.htm)  [Materials](http://docs.google.com/materials.htm)  [Procedure](http://docs.google.com/procedure.htm)  [Results](http://docs.google.com/results.htm)  [Conclusions](http://docs.google.com/conclusions.htm)  [Recommendations](http://docs.google.com/recommendations.htm)  [Acknowledgments](http://docs.google.com/acknowledgements.htm) | To begin this experiment a spot was cleared where the grass was easily accessed when it was growing in the garage. A fluorescent growing light was obtained from my biology teacher to allow the grass to grow inside the garage. The garage was picked for the place to grow the grass since the variables such as light, rain, wind and heat could be controlled. Tall Fescue grass was bought that was 99.99% weed free and 89% the same species of grass, reducing the chance of data contamination. These were the best percentages in the store. Dirt that is guaranteed weed and pest free was bought, controlling the variable of contaminated dirt. (See Figures 1, 2,3) Since it was in the middle of winter and the seeds require higher temperatures, trays were bought with a 15 watt heating bulb. The trays are 8 x 16 cells so they were cut them in half to make two 8 cells x 8 cells trays. (See Figure 4) The cut trays rest in a double tray that deflects3 the heat evenly and hold water for watering the grass. Each tray will have an ample population for the study with 64 cells with about 50 blades of grass in each cell. The trays were filled with the dirt, covered in grass seeds and covered with another loose layer of soil. (See Figures 5, 6) The trays were placed in the double trays and set under the growing lamps in the heated boxes. The growing lamp should be shinning evenly on all parts of the plants and the water in the double tray should be evenly dispersed. The growing lamp should be far enough away from the trays so that it won't burn the grass when it starts growing. (See Figure 7) The heating lamps were monitored to make sure they were emitting the same amount of heat by placing thermometers in each tray. The grass was allowed to establish itself before starting the sound tests to make sure each tray of grass was growing equally.  With the assertion that sound, based on its frequencies and wave pattern, will negatively or positively effect plant metabolism, five different types of music that produced different frequency spectrums were needed. One tray was going to be the control, with no music being played to it. The music finally decided on was a Hard Rock song by Static X called Push It, a Hawaiian song by Brother Iz called O lea e a, a Classical song composed by Mozart called Piano Concerto No. 21: Andante, a Jazz song by Herbert Laws called Herbie's Blues, and a Rap song by Will Smith named Big Willin'. Twenty seconds was selected from each song and burned onto a CD. The CD player can repeat the track for the 12 hours the plants will be tested. (See the graphs)  The grass was cut to a uniform height before it was tested for the first time because it had gotten to be over a foot high and could reach its maximum height. The tray was placed in a 27 ¾ in. x 30 ½ in. x 28 ¾ in. heavy cardboard box. The stereo was placed inside of the box and turned to the track number for each tray. The track was 20 seconds long and repeated itself for 12 hours. Each track has been tested with the stereo to check its decibel reading and the volume has been marked so that each track will be playing at 80 decibels. The grass was tested for 12 hours since the more exposure it had to the music, the better it would be. Since room was limited were the grass could be put without being heard by the other grass, testing one tray per day had to be satisfactory. The variables were controlled by placing the grass in a box, eliminating sunlight as a factor. The box was in a room outside, protecting it from the other elements. Another box was set up inside later on with close dimensions. The temperature was the same since the room inside was blocked off from heat. By keeping the grass out of sunlight during the playing process, it also ensured that the only energy reaching the grass during that time was the sound waves. The amount of extraneous noise reaching the two trays could not be controlled, but it is doubtful that one received more than the other. (See Figure 8)  The grass was measured at the end of the experiment, although pictures were taken before each round of testing. Although only needing 30 blades of grass to get an accurate representation of the population, only the middle four cells of each tray were measure to get rid of any bias in the selective process. Only the green blades were measured, since the brown ones were from before the sound testing. By measuring the middle four cells, a density approximation could be reached. (See Figure 9)  The grass was analyzed in my biology teacher's lab. Since a starch test would most likely turn the whole blade black and make any difference between the trays indistinguishable, only the spectrophotometer test was performed. Two grams was cut off from each grass tray at random locations throughout the tray. They were massed to exactly 2.00g. They were then added to a 100mL mixture of 30% acetone and 70% distilled water. The mixture was blended at high speed for 15 seconds. The solution was then poured through a paper towel filter one sheet thick to filter the grass not blended up and any foam in the solution out. The flacks were labeled and put in the refrigerator overnight. The spectrophotometer was used the next day to analyze the chloroplast's absorbency for each tray at wavelengths from 400 to 720 at intervals at 20. The chlorophyll mixture was put in tubes that fit into the spectrophotometer. The chlorophyll had settled in 5 out of the 6 tubes, the 6th being the first and being blended longer than 15 seconds. The spectrophotometer was loaded with a plain acetone tube to calibrate it. The tubes were wiped clean so fingerprints would not interfere with the reading, and inverted several times until the chlorophyll was completely suspended in the acetone. The data was recorded and analyzed. (See Figures 11, 12, 13) |