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Lab 3 Report

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**Significant Difference in Varying Gibberellin Concentration on Radicle Length**

**Abstract**

We hypothesize that increased concentration of Gibberellin will result in *Lactuca sativa* seed embryo radicle length growth. The purpose of the study is to determine the effect of hormones, specifically Gibberellin, on plant radicle growth to better understand how the agricultural industry can effectively use hormones to increase production. The approach taken to address the hypothesis was that we conducted six different trials where we grew six *Lactuca sativa* seeds on four different plates which experienced 24 hour cycles with 12 dark and 12 light hour cycles. Each plate included a different concentration of Gibberellin (1.0E-4, 1.0E-5, 1.0E-6, 1.0E-7, and 1.0E-8 M). The statistical analysis we used was an ANOVA and Tukey-Kramer test and the results were found to be significant (p **≈** 4.93E-4, α = 0.05) and this indicated that there was a statistical difference between the means of different groups. The Tukey Kramer test found that there was a significant difference in control and the treatment groups with the concentration levels of 1.0E-4, 1.0E-5, 1.0E-6, 1.0E-7, and 1.0E-8 M. In conclusion, our results confirmed our initial hypothesis. These results matter because it is a good indicator that Gibberellin would be a useful hormone to increase agricultural production.

**Methods**

The experiment conducted was testing the effect of Gibberellin concentration on radicle length and the purpose was to determine hormonal effects on plants to better understand how to influence plant growth artificially. The first step was to place six *Lactuca sativa* seeds on filter paper inside a Petri dish. The seeds were spread out in a hexagon pattern and then a serial dilution procedure was used where we took 0.7 μl of an initial stock solution with a concentration of 1.0E-4 and added it to 6.3 μl of deionized water. We then took that solution and pipetted 0.7 μl and added it to 6.3 μl of deionized water. This entire process was repeated four times to create the concentration levels of 1.0E-4, 1.0E-5, 1.0E-6, 1.0E-7, and 1.0E-8 M. Then we pipetted 6.3 μl of each treatment solution onto a respective plate and deionized water was our control. After adding the solution, we sealed the plates with Parafilm to prevent evaporation of the solution. The plates were then placed under UV light and were grown in a 24-hour day cycle which consisted of 12 hours of light and 12 hours of dark. Radicle length measurements were then taken after one week using digital calipers. Then an ANOVA test was conducted on all groups and a threshold of α = 0.05. In addition, the Tukey-Kramer test was also ran to find significant differences between pairs of treatment groups and also had a similar threshold of α = 0.05.

**Results**

The overall findings of this study is that there is a significant difference in Gibberellin concentrations and radicle length. An ANOVA and Tukey-Kramer test and the results were found to be significant (p **≈** 4.93E-4, α = 0.05) and this indicated that there was a statistical difference between the means of different groups. The Tukey Kramer test found that there was a significant difference in control and the treatment groups with the concentration levels 1.0E-4, 1.0E-5, 1.0E-6, 1.0E-7, and 1.0E-8 M. For the concentration levels of control, 1.0E-4, 1.0E-5, 1.0E-6, 1.0E-7, and 1.0E-8 M, the average means were 1.38, 12.8, 12.1, 7.92, 7.92, and 3.80 M respectively. For the concentration levels of control, 1.0E-4, 1.0E-5, 1.0E-6, 1.0E-7, and 1.0E-8 M, the standard deviations were 1.38, 8.12, 8.24, 1.79, 1.79, and 0.396 M respectively.

**Figures**

**Figure 1. Gibberellin Growth Concentration Effect on Radicle Length** Above is a bar graph of means of the five treatment groups (1.0E-4, 1.0E-5, 1.0E-6, 1.0E-7, and 1.0E-8) and control (Water), and ANOVA found a statistical difference between the groups (p **≈** 4.93E-4, α = 0.05). Data was collected by growing *Lactuca sativa* seeds on plates with each given treatment under UV light with 12 hour light cycles for one week.

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