Plants on Acid

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Introduction

We chose to investigate the effects of Gibberellic Acid on the growth and leaf development in wild type and rosette Brassica rapa plants. Brassica rapa plants are bred for their rapid life cycle and ability to grow significantly in a short amount of time. This growth, however, is dependent on the presence of Gibberellic Acid in the plants. The rosette phenotype of Brassic rapa is "conditioned by a single gene mutation which, in the homozygous condition ros/row, results in 4 to 10 times less gibberellin in the tissues." (Fast Plants Worksheet) Rosette plants affected by this gene mutation appear dwarfed; the internodes of the plants do not lengthen and the leaves lie flat on the soil. In addition, normal flower development is impeded and the plant produces very few seeds. When Gibberellic Acid is added to the rosette plants, growth should occur and should exceed normal growth in the wild plant.

Hypothesis

Based on the information in the "Fast Plants" worksheet, we hypothesized that the plants, both wild type and rosette, that received the Gibberellic Acid would exceed the growth of the wild type and rosette plants that only received water.

Methods

We began our experiment by selecting and cleaning out four quads to grow our plants in. We marked the quads "wild type water, wild type acid, rosette water and rosette acid" and inserted wicks into the bases of the quads to absorb water. We then added potting mix to our quads, as well as a small amount of fertilizer. Next, we placed the correct seeds in each quad, as specified by their labels.

We then prepared our watering systems, soaking water mats in water mixed with 2 ml of liquid detergent. We repeated the soaking twice more and then laid the soaked mat across the platform. We filled the reservoir with water and secured the platform on top of it. We placed our quads on top of the platform.

We returned every day for the next three days to water the quads from above and then moved our assessments to every third day. Each time a team member came in to check on the plants, she measured the height of each plant's stem in cm from the top of the quad wall to the highest point of the stem and counted the number of leaves on each plant in the quad. She then recorded this data and took a picture of each quad.

We did this for a week and then began to vary our methods. Beginning on day eight we applied a drop of Gibberellic Acid to each leaf of the plants marked to receive Gibberellic Acid and one drop to the plants that were to receive water. We continued to record the height of the plants in the same manner as before and to count the leaves.

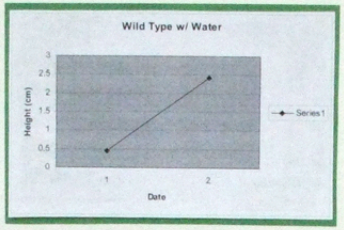

Figure 1

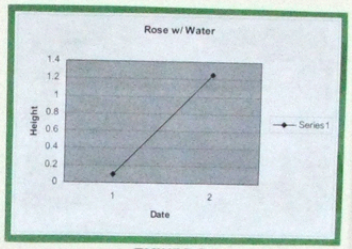

Figure 2

Date 1: 29 September
Date 2: 13 October

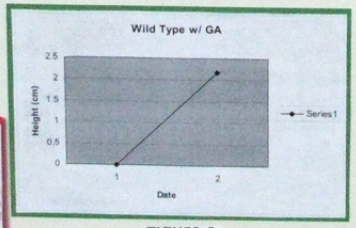

Figure 3

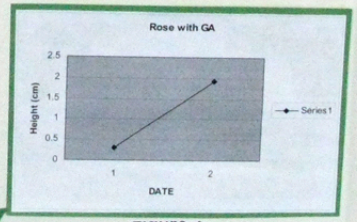

Figure 4

Results

Throughout the weeks beginning on 29 September through 13 October, each of our plants grew regardless of whether or not the Gibberellic Acid was applied; thus proving our hypothesis invalid. As our graphs (Figures 1-4) show, each of the plants grew a sufficient amount in the short time documented. Our results and documentation period were cut short, however, because our plants died over the long weekend of our fall break. Overall, we must conclude from the results that we were able to gather, that the Gibberellic Acid had no more of an affect than water on the growth of our plants.

Conclusion

In this experiment we chose to study the effects of Gibberellic Acid when added to the Rosette plant and a wild-type plant in comparison to the same types of plants only treated with water. The results should have shown an increase in growth by elongating the stem and leaves of the dwarfed Rosette and wild-type plants that were treated with a regular dose of Gibberellic Acid. The wild-type plants only treated with water would have a normal growth, while the Rosette plant would remain in its dwarfed state with leaves that lay flat on the soil. The results received however do not support our hypothesis.

In both cases of Gibberellic Acid and water, the plants had uneven results that did not coincide with what was expected. It is only safe to conclude that there were circumstances that prevented the correct reactions to occur. In a pod of four Rosette or four wild-type plants receiving the Gibberellic Acid treatment, one of the four may have received much more or much less acid then its surrounding seeds. This would produce an uneven growth amongst the pod. The wrong seeds may have been put into the wrong pod and this would also produce results that would go against our hypothesis. Other aspects such as water amount available to the plants as well as the amount of light each pod was receiving would have also hindered the results of any of the fast plants if not enough or too much was provided. Therefore, due to experimental errors, our hypothesis was incorrect.