

The effects of gibberellic acid



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The main objective for this experiment was to examine the effects of Gibberellic Acid which is a plant hormone on different genotypes of a plant called Brassica rapa, which included wild type, petite, elongate, and rosette. The wild type and petite have the same amount of Gibberellic Acid, but the elongate over produces it and rosette under produces it. The experiment was placed on top of a wick, while the wick is leading the underneath to keep the plants moisturized. The project took place over eight days. Each group member came in each day and measured the height plant growth with a small ruler in mm. We recorded the information and collected them into a chart.

Introduction:

A hormone is a chemical that is released on cell or part of a body and travels to some target cell where a receptor protein will bind that hormone and trigger of some change within the cell of the receiving cell. Since plant don't have a nervous system, hormones are the major way that plant tissues communicate each other (Campbell & Reece, 2010). Gibberellic Acid is plant

hormone that occurs in plant growth. Gibberellic Acid also known as GA3 is involve in stem elongation and increasing the size of plant parts. GA3 works on germination by supporting growth in the embryo of a seed. In other words, GA3 causes quick germination of the seed and break out of dormancy (Seed Dormancy and Effects of Plant Growth). They are also involve in having the plant become active again if they loose their leave during the winter. The main focus for this experiment is to prove how much hormones effect the plant growth.

Cycocel is plant growth that provides height control by reducing stem elongation. When shoots and stems are treated with Cycocel, they are more impact and stronger with deeper green growth. Cycocel inhibits GA3 from elongating the stems of the plants (The Effects of Gibberellic Acid and Cycocel on The Growth of Cultured Leaf Tissue).

The plant that was used for this experiment was Brassica rapa plant. It is a fast growing plant, complete its life cycle in around forty days also mostly related to the mustard group. There were four different genotypes used to complete this experiment. They were wild type, petite, and rosette(McKeon and Warren, 2012). The rosette plant is much shorter than a wild type plant. The elongated is much taller than a wild-type plant. The petite plant is about half as tall as a wild-type plant. Three different experiments were done on the genotypes. First water was added to the control, second the Gibberellin Acid 3, and then Cycocel was added to the genotypes. Then comparison was made to their growth to see much they were affected.

The purpose of this experiment was to make a comparison of the effects of the GA3 and Cycocel on brassica plants. Then this will allow us to measure the growth of the plants. The hypothesis for this experiment is that when adding GA3 to the rosette of Brassica rapa the plants will increase in its height compared to the plants that have just water when adding GA3 to the wild type of Brassica rapa the plants will again increase in its height compared to the plants that have just water added to them.

Material and Method:

The four different genotype used for this experiment were wild type, petite, and elongated, rosette. The plants were planted in Styrofoam container that had squares and each square had one plant planted on. The Styrofoam was placed firmly on top of a wick material that led to water under the plants (figure 1). The wick absorbs water and carries it into the plants and this provides a constant source of water for the fast plants. The plants were divided into three separate sections because they were sprayed with three different solutions: water for control, Gibberellic Acid (100ppm solution), and Cycocel (1: 100 dilution) or B-Nine (McKeon and Warren, 2012). A tube was placed around the plant and sprayed three times over the plants. The tube was used in order to protect the other two plants.

A small ruler was used to measure the plants. The plants were measured once a day for eight days in mm, they were measured from the top of the Styrofoam to the top of the plants. We followed their growth and effect of the solutions against the plant for eight days, and then we organized the information into graphs to compare their growth for eight days.

Figure 1 “ Plant Set-Up and Treatments”: This is the actual setup for the plants. Each square was planted with one plant.

Results:

These graphs were collected from the experiment and the measurements were done in mm.

Figure 2 “ Wild Type Treated Growth Chart”: This explains the growth for the wild type when *Brassica rapa* plants are treated with GA3 and Cycocel. As this figure shows, the GA3 treated plants grew much bigger than the other plants. The Cycocel did not grow as big as the GA3.

Figure 3 “ Petite Treated Growth Chart”: This result is from the petite of the *Brassica rapa*. The graph shows that the results look similar to figure2. The GA3 treated plant expanded its growth but the Cycocel treated plant did not.

Figure 4 “ Elongated Treated Growth Chart”: These results are from the experiment of Elongated of *brassica rapa*. It shows that GA3 treated plants are still expanding and the control seems to be expanding too but not as much as the GA3 treated plants. Overall, the control and the GA3 grew a lot taller than the Cycocel treated plants.

Figure 5 “ Rosette Treated Growth Chart”: these results show the Rosette of *Brassica rapa* experiment. It shows that GA3 treated plants show the most growth. They also show that there were small differences between the control plants and the Cycocel treated plants. They grew in unity together, but the Cycocel has only small effects on the plants.

Discussions:

For the results for the wild types experiments, the plants that were treated with the GA3 solution grew an extraordinary amount compared to the control. They grew about 2 mm a day. The plants that were treated with Cycocel solution grew about the same as the control. This shows that the Cycocel treated plants did not have that great effect on the plants' metabolism. At the end of experiment the control a little more than the Cycocel treated plants, as seen in Figure 2.

The results of Petite experiment were roughly the same as the Wild Type. The plants that were treated with the GA3 solution grew a few mm more than the control and the Cycocel treated plants. As Figure 3 show, the control and the Cycocel treated plants grew equally. On the final day of the experiment, the control showed a dramatic increase in its growth, but the Cycocel treated plants did not increase at all, as seen in Figure 3.

The results for elongated experiment were a little different from the other two experiments. The GA3 treated plants grew even more. The control grew a large amount of growth. The Cycocel treated plants had a very small amount of growth compared to the other two experiments, as seen in Figure 4.

The final experiment that was completed was the Rosette of Brassica rapa. The experiment showed the most growth with GA3 treated plants. The Cycocel treated plants and the control grew almost at the same length in each experiment, as seen in Figure 5.

The results of the experiment do support the hypothesis. It was hypothesized that if we add GA3 solution to the Rosette of Brassica rapa the plants will increase in its height compared to the plants that have just water. It was also hypothesized that if we added the GA3 to the Wild Type of Brassica rapa the plants will again increase in its height compared to the plants that have just water added to them. The GA3 solution added to Rosette and The GA3 added to the Wild Type did increase in every experiment until the last.

Conclusion

In conclusion, experiment show the GA3 does effect the growth of the plant, but only it is only effective when it is used to treat it with plants. When GA3 is added to a plant with an equal amount of gibberellins, it increases its growth compared to the plants treated with water. The experiment also shows that GA3 is extremely important in germination of seed and plants.

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