



CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

Name(s) Wynn Phaychanpheng; Audrey Sogata	Project Number S1914
Project Title The Effects of Abscisic Acid on Growth of Unstressed and Stressed Brassica rapa	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To test possible effects of application of abscisic acid on unstressed and water stressed Brassica rapa, and see if ABA's role in stomata and water usage in a plant would help the plants better combat drought stimulation. Additionally, we wanted to find out what time in the Brassica rapa life cycle would be the optimal time for application to increase number of buds, leaves, flowers, height, and pods. We predicted days 15 and 17 would be the prime time for application because it is near the maturing stages of the Brassica rapa.</p> <p>Methods/Materials We provided a sustainable environment for the plants using an artificial lighting system and a self-watering deli cup system. We tested a total of 40 plants, in which 20 were unstressed and the other 20 were stressed by reduction of water intake. We also further separated them into groups based on what days we applied the hormone: Days 9,11, Days 15,17, and Days 21,23, in addition to a control and an ethanol(solvent) control. To apply the ABA, we created a solution using ethanol soluble ABA, ethanol, and distilled water; we sprayed each plant with approximately 3.2 ml of solution per application day.</p> <p>Results We found that ABA does not have as much as an effect in the areas of plant height and number of pods, but it does in the areas of number of leaves, buds, and flowers. In the unstressed group we noticed the plants treated with ABA had stunted growth; for example, the leaves had an average growth rate of -3.95% (Days 9, 11) group, 9.09% (Days 15,17) and 2.27%(Days 21,23). In comparison, the control groups had an average growth rate of 22% and 30%. For the stressed group, the effect was quite the opposite. There was an increase in average number of buds and flowers particularly. In both groups, the plants applied with ABA on Days 9,11 produced the most profound effects.</p> <p>Conclusions/Discussion Our hypothesis on the optimal time of application being Days 15,17 was not supported; application on Days 9,11 produced the most prominent effects. Furthermore, we found that when ABA is applied to unstressed Brassica rapa, growth is stunted, and when applied to water-stressed plants, growth is increased in buds and flowers. The life span of the stressed group with ABA application was also increased. This discovery can benefit agriculturalists by providing an innovative way to reduce the amount of water needed to sustain growth, or even improve it in plants.</p>	
Summary Statement We tested the effects of abscisic acid on unstressed and water-stressed Brassica rapa and discovered a procedure to help reduce water intake of plants naturally.	
Help Received We bounced back ideas with Dr. Amy Litt, however we designed, performed, and analyzed data from our experiment ourselves. The statistics teacher at our high school, Mr. MacIntosh, aided us with learning valuable statistical tests.	