



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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Project Title Jasmonic Acid Regulation of Abiotic Stresses in Brassica rapa and Arabidopsis thaliana	
<p style="text-align: center;">Abstract</p> <p>Objectives To test if jasmonic acid is a feasible solution to combatting drought and salinity stresses in two types of plants, Brassica rapa and A. thaliana.</p> <p>Methods Planted 50 Brassica rapa and 50 A. thaliana seeds and sustained them using a self-watering deli cup system and 24/7 light source. To salt stress the plants, we created a solution using NaCl and CaCl, and tested 6EC and 12EC concentrations. To drought stress, we limited water reserve weekly(5 and 3mL). Jasmonic acid (JA)solution was created by mixing 200mL of water to 42 uL 90% JA 10% ethanol solution, and then applied periodically. Each plant species had a control, JA control, 6EC control, 6EC JA, 12EC control, 5ml dry stress control, 5ml dry stress JA, 3ml dry stress control, and 3ml dry stress JA group.</p> <p>Results JA control for Brassica rapa had the highest average growth rate for every aspect of the plant except flowers. Its dominance was especially profound in leaves and buds (24.5% and 37.5% respectively). Superiority of the JA control was also reflected in A. thaliana; this plant group had an average rate of growth increase of 54.86% for stalk height, and a 222.14% increase in buds! For the stressed groups, only a slight increase in growth rate for some areas was observed; e.g. an increase of 25.36% in stalk height for 12EC Salinity JA compared to 17.29% for 12EC Control, and reduced growth in others; e.g. 74.29% increase in leaf count in 6EC Control yet only a 37.71% growth in the JA group. However, we noticed the stressed plants treated with JA were more vibrant and sturdier relative to the other flaccid salt-stressed plants. JA also allowed drought-stressed plants to survive longer and appear healthier than the control.</p> <p>Conclusions We hypothesized the plants treated with 6EC of salinity and JA would be the most successful plant group; however, this was not supported as the most successful group was JA control, which had the overall highest average rates of growth for both Brassica rapa and A. thaliana. Additionally, JA did aid in improving stress tolerance, creating sturdier and greener crop and quickening stressed plants development so lofty fruit production could occur before stress accumulated to an unmanageable level. Thus, JA is a viable solution for combatting stresses in agriculture without harming produce. Farmers globally can use JA as a means for growing crops in drought-prone or increasingly prevalent salty regions.</p>	
Summary Statement We tested the effects of jasmonic acid on salinity and drought stressed Brassica rapa and A. thaliana and discovered a method to increase stress tolerance and overall development in crops.	
Help Received We consulted with Mr. Brandon Young and used his laboratory at Murrieta Genomics to conduct an extension to the experiment.	