



CALIFORNIA STATE SCIENCE FAIR

2013 PROJECT SUMMARY

Name(s) Kevin Chiv; Andre Poon	Project Number S1907
Project Title	
Antimicrobial Chemicals in Plant: Identifying the Chemicals that Contribute to Oxalis Pes-caprae's Resistance to E. coli	
Objectives/Goals This is a two year research project that is focused on the antibacterial properties in plants. This time, we are trying to identify the specific compound Oxalis pes-caprae produces in response to E. coli infections. We predict that pathogenesis related proteins (PR proteins) are largely responsible for the antibacterial properties of the weed. Previous studies indicate that PR proteins, in particular, share homologous relations with antimicrobial mechanisms. It is then logical to hypothesize that the specific compound we are looking for is a PR protein.	Abstract
Methods/Materials By using a spectrophotometer and a color sensitive JAVA program, our group was able to test if there were increases in protein concentrations in the plant extracts. The plant extracts were exposed to Biuret solution, which is an indicator from proteins. By creating 2% concentrations of the control group (not infected) and the infected oxalis plants, we made the solution's hues as similar to each other as possible to eliminate color difference prior to the experiment. The JAVA program gave us a RGB color concentration reading, and the spectrophotometer would give us an accurate reading of the actual color change.	
Results My hypothesis was generally being supported. Although the null hypothesis was being rejected, the alternative hypothesis was still being supported, since there was a clear increase in color concentration. An average of 7.78% color change between infected and the control group was observed from the JAVA program measurements, and a 634% difference in absorbance and -32.4% difference in transmittance was observed from the results from the spectrophotometer.	
Conclusions/Discussion Errors in this experiment include a false plant concentration, external factors that may have affected the oxalis population prior to the experiment, and the lack of trials. These errors could be avoided in the future by obtaining more materials for more trials, and by keeping track of what procedures were being completed. For our next procedure, SDS-page and Western-bloting would be implied to identify the protein size and concentration, which would allow us to narrow down the types of pathogenesis related proteins down, and would show what PR proteins are produced by the plant in response to the infection.	
Summary Statement Identifying the antimicrobial chemical that is produced by Oxalis pes-caprae in response to bacterial infections.	
Help Received equipment aid from Gabrielino High School; Prof Mok's advice and assistance on the project, especially on particular steps; \$2500 USD sponsorship from family to purchase material and equipment; supervision under Mr. Velekei at school laboratory, and Prof. Mok on procedures and experiment quality.	