



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Virginia F. Hsiao	Project Number S1716
Project Title Investigating the Effect of Antioxidants in Dark Chocolate	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals As individuals become more health conscious, they begin to feel afraid to indulge in sugary treats and desserts; however, when they succumb to these delectable temptations, they feel guilty and fear for their health. Recent studies, however, show that chocolate contains high antioxidant content. The goal is to examine how effective antioxidants in chocolate are, in helping the body "defeat" harmful free radicals by directly testing the effect on free radical damaged seeds. This reflects our life, as free radicals pose a major threat to health, and antioxidants that are produced and ingested into the body can reverse and prevent the damage.</p> <p>Methods/Materials To test the effects of chocolate's antioxidants, radish seeds were placed into hydrogen peroxide to simulate free radical damage. Then, the seeds were treated with different concentrations of cacao powder (45% concentration, 100% concentration, and a control). Afterwards, the seeds were placed in separate peat pots, watered, and recorded daily. Effectiveness was directly measured by seed germination rate and growth rate.</p> <p>Results The results indicated that there were different growth rates of each level (45%, 100%, and control) at different periods of time. T-tests were used to examine whether growth rates were statistically significant between 45% concentration and control group as well as between 100% concentration and control group. The results indicated that the third period of the 45% concentration plant's growth rate was statistically significant, compared to control group. Since the 45% concentration led the third period with a growth rate of 1.705 millimeters, it proved that the 45% concentration had the most effect on the seed's growth.</p> <p>Conclusions/Discussion This study demonstrated that it took some time for the antioxidant's effect to kick in. Additionally, the study showed that the presence of antioxidants is important; however, the benefit was not directly linked to the quantity. Rather, the 45% concentration was successful, because it had just enough to sustain a healthy plant. Dark chocolate's ability to aid in neutralizing and preventing free radical damage could offer an economic, delicious method to stay healthy and perhaps combat diseases. By consuming dark chocolate in moderation, one can become healthier.</p>	
Summary Statement I investigated the effectiveness of antioxidants in dark chocolate by directly testing the effects on plants; Dark chocolate's ability to aid in neutralizing free radical damage offers a delicious method to stay healthy.	
Help Received Special thanks to science teacher, Mrs. Ward for not only giving me a facility to conduct my experiment, but also for allowing me to use her growth lights in my experiment. In addition, she gave me advice and supported me throughout my experiment. My family also helped me purchase my materials.	