



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Maya R. Wilson	Project Number J0514
Project Title The Effectiveness of Antioxidants on Inhibiting Enzymatic Browning	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective was to determine if antioxidant beverages with higher rankings on the USDA Oxygen Radical Absorbance Capacity (ORAC) scale will more effectively protect a cut apple from the oxidation that occurs during enzymatic browning.</p> <p>Methods/Materials I tested green tea and 4 different antioxidant fruit juices (with high, medium, and low ORAC scores) by soaking apple slices in the beverages and placing them in the air to oxidize. I observed the apples at intervals and measured the extent of enzymatic browning using a score sheet I created that included both extent of browning and depth of color. The amount of enzymatic browning determined the amount of oxidation and the effectiveness of each antioxidant. I repeated the experiment three times.</p> <p>Results Based on the averages of my experiments, the order of effectiveness was lemon juice (ORAC 1,225) which performed 73% better than the control (filtered water), mangosteen juice (ORAC 2510) performed 43% better, green tea (ORAC 1,253) performed 13% better, pineapple juice (ORAC 568) performed 10.6% better, and papaya juice (ORAC 300) performed 2.4% better than the control.</p> <p>Conclusions/Discussion My hypothesis that antioxidants with higher ORAC values will reduce the amount of enzymatic browning better than those with lower ORAC scores was correct for 4 out of 5 antioxidants tested. The exception was lemon juice, which despite having a lower ORAC score than either mangosteen juice or green tea, did significantly better than all the others in all 3 experiments. Mangosteen, with a very high ORAC score, did significantly better than the three other juices while papaya, with the lowest ORAC score, did only slightly better or in 2 cases, worse than the control. Generally, the higher the ORAC score, the better the beverage worked to reduce enzymatic browning. Thinking about why the lemon juice did better than all the others despite having only a midrange ORAC score, I believe it may be because lemon juice combines a midrange ORAC score with a high acidic PH value, providing stronger protection against oxidation and enzymatic browning than beverages with a high ORAC score and a lower ph score. Testing this hypothesis would be an interesting experiment for next year!</p>	
Summary Statement My project determined that generally a higher ranking on the USDA ORAC scale of an antioxidant beverage will better protect a cut apple from the oxidation that occurs during enzymatic browning, with the exception of highly acidic juices.	
Help Received My mother helped me stay organized, took photos, and assisted me in cutting paper for my backboard.	