



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> <b>Hafsa Khan</b>	<b>Project Number</b> <b>J1812</b>
<b>Project Title</b> <b>The Antioxidant Mystery: The Effects of Antioxidants and Free Radicals on Seed Germination</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this experiment was to study the protective effects of antioxidants on free radical damage on radish and bean seeds. Antioxidants such as Vitamins A, E, and C were used on hydrogen peroxide which was a source of free radicals. It was hypothesized that Vitamin E would be the best against Vitamin A and E. Results indicated that Vitamin A was proven to be the best vitamin which allowed the most seed germination and protected the plant cells against free radical harm.</p> <p><b>Methods/Materials</b> Radish and bean seeds, hydrogen peroxide, antioxidants (Vitamin A, E, and C). Germinated seeds to prove which vitamin allowed the most seed germination and protected cells against free radical damage.</p> <p><b>Results</b> In all radish and bean seed trials, Vitamin A was the vitamin which allowed the most seed germination followed by Vitamin E, and then Vitamin C. Repeated trials were run to determine if this was accurate, and in all trials Vitamin A surpassed the other two vitamins.</p> <p><b>Conclusions/Discussion</b> Repeated trials with antioxidants and free radicals on seed germination revealed that certain vitamins do prevent free radical damage on plant cells. It was concluded that Vitamin A continuously overcame Vitamins E and C in the growth of most germination and protected more plant cells against free radicals.</p>	
<b>Summary Statement</b> Using antioxidants such as Vitamins A, E, and C on hydrogen peroxide as a source of free radicals, it was concluded that Vitamin A allowed the most seed germination and protected the most plant cells against free radical harm.	
<b>Help Received</b> I performed the experiment myself, Sr. Rogina, my science teacher and advisor, helped to organize data.	