



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Hamna Khan	Project Number J1911
Project Title The Antioxidant Mystery: The Effects of Antioxidants and Free Radicals on Seed Germination	
Abstract Objectives/Goals The purpose of this project was to determine which type of vitamin is most effective for protecting plant cells against free radicals. Methods/Materials Radish and bean seeds, Vitamins: A,C and E, hydrogen peroxide. This science fair experiment involved placing bean and radish seeds in a hostile, artificial environment which contained hydrogen peroxide as a source of free radicals. Vitamin A,C and E were added to these groups of seeds to study their protective effects as antioxidants. Results Results indicated that in all seed germination trials, vitamin A was consistently the vitamin that allowed the most seed germination. In the radish seed trials, the seeds exposed to hydrogen peroxide had the least percentage of germination. Conclusions/Discussion In this experiment, the effects of antioxidants on germinating seeds exposed to free radicals (hydrogen peroxide) were studied. It was determined in the experiment that among vitamin A, E, and C, vitamins with antioxidant properties, Vitamin A consistently allowed the largest percentage of germination to occur. This was proven true in both the radish and bean seed trials. Vitamin C was consistently the vitamin that germinated the smallest percentage of seeds. The beneficial antioxidant effects of Vitamin E are often publicized, and in the hypothesis it was speculated that Vitamin E would be the best antioxidant. However this assumption has been receiving a lot of attention, as more recent studies have indicated that Vitamin E might not have all the benefits attributed to it earlier.	
Summary Statement The effects of antioxidants on germinating seeds exposed to free radicals (hydrogen peroxide) were studied, and it was later determined that vitamin A is the most effective antioxidant.	
Help Received I performed the experiment myself with the advice given by the coordinator.	