



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Christopher H. Helling</b>	<b>Project Number</b> <b>J1414</b>
<b>Project Title</b> <b>How Effective is Beta-Carotene in Fighting Cancer in Plants?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective is to determine if beta-carotene has any substantial effect in reducing or eliminating the presence of Agrobacterium tumefaciens in plants.</p> <p><b>Methods/Materials</b> Materials used in the experiment were sunflower seeds, beta-carotene (vitamin A) of 25,000 IU, tap water, flower pots and soil, any standard type of disinfectant, a candle or match, an inoculating needle, a USDA permit, and Agrobacterium tumefaciens, the plant carcinogen.</p> <p><b>Procedure</b> The first thing needed was to divide the sunflower seeds in three groups. Germinate the seeds in group A in the beta-carotene solution and the seeds in group B and C in tap water. After the seeds have germinated, plant them in the flowerpots in potting soil. Allow the plants to grow approximately seven to ten inches, after which the plants in Groups A and B will be ready for inoculation. Sterilize the inoculation needle by holding it for three seconds in the flame of the candle. Draw some Agrobacterium tumefaciens culture onto the needle tip and inject the plants from Group A. Then sterilize the needle again and inoculate the plants from Group B. Do not inoculate the plants from Group C. Continue to water the plants in Group A twice each week with the beta carotene solution and the plants in Group B and C with tap water. Record growth rates of the plants each week and note their appearances and record the rate of deterioration.</p> <p><b>Results</b> Results of this experiment show that plants injected with Agrobacterium tumefaciens and treated with beta-carotene successfully fought off the carcinogen. The plants in group A2 resumed normal growth seven days after inoculation, meaning the plants were definitely healthy during the entire process. The average growth rate before inoculation was 0.295 in/day, while after the inoculation it dropped to 0.294 in/day. This means the plants health hardly varied. The plants continued to grow normally, proving that the beta-carotene successfully fought off the plant carcinogen. Beta-carotene is known to target and kill the dangerous and harmful cells in plants, and in this case, the beta-carotene eliminated the Agrobacterium tumefaciens cells inhabiting the sunflower plant, allowing the plant to continue living. Beta-carotene is very effective in fighting cancer in plants.</p> <p><b>Conclusions/Discussion</b> Conclusion</p>	
<b>Summary Statement</b> To determine how effective beta-carotene is in fighting cancer in plants.	
<b>Help Received</b> Mother received USDA permit and bought the plant carcinogen.	