



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> Alicea Cock- Esteb	<b>Project Number</b> <b>S1405</b>
<b>Project Title</b> <b>The Effect of Different Levels of Cigarette Smoke on the Wet and Dry Mass and Quality of Growth of Radish Plants</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My experiment was conducted primarily to experience first hand the effects of cigarette smoke as well as possible types of pollution, such as car exhaust, on plants. <b>Methods/Materials</b> In order to set up the experiment, I put together three small greenhouses, that each housed 25 plants, one for each level of the independent variable. They were exposed to cigarette smoke as follows: no cigarette exposure, exposure to one cigarette of smoke every other day, and exposure to one cigarette of smoke every day. Every day I used a rating system to find the qualitative value for every single plant. After the experiment I recorded the wet mass of every plant. I dried the plants for 96 hours and measured the dry mass of all of the plants. <b>Results</b> By finding the median of the qualitative data and using an ANOVA test I determined that the plants with exposure to cigarette smoke every day statistically were less healthy than the plants that were exposed every other day. The plants that were not exposed to smoke at all had a median ranking of four points, the plants exposed to smoke every other day had a median ranking of three points, and the plants exposed to smoke every day had a median ranking of one point. I looked at the mean of the wet mass of the plants (Plant A- 0.269 g, Plant B- 0.166 g, Plant C- 0.136 g), and the results the Analysis of Variance inferential test on the dry mass, (Plant A- 0.036 g, Plant B- 0.035 g, Plant C- 0.020). When conducted, the results allowed me to accept my research hypothesis with a 99.99% confidence level. <b>Conclusions/Discussion</b> This experiment was conducted to determine if cigarette smoke has an effect on plant growth. By collecting and testing the qualitative ranking, wet mass, and the dry mass after fourteen days, it was statistically concluded there was a difference between the results of each of the levels of the independent variable. The plants with one burned cigarette every day were worst off in terms of growth while the plants exposed to no cigarettes at all were the best well off. This is true due to the particles of the smoke invading in the plants and blocking the nutrients from entering the plants correctly. Smoke does affect the growth and mass of plants.	
<b>Summary Statement</b> I tested the exposure of different levels of cigarette smoke on the growth and health of plants.	
<b>Help Received</b> My advisor, Millie Hackworth, and my sister, Hillary Emer, both helped edit my write-up. My father, Richard Esteb, purchased the materials.	