



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Alicia L. Lovelace</b>	<b>Project Number</b> <b>J1718</b>
<b>Project Title</b> <b>Legumes with Nitrogen and CO(2): A Murder Mystery</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The goal of this project is to figure out whether plant growth is more dependent on nitrogen or CO <sub>2</sub> and whether plants grow stronger and faster when both of these variables are increased together. I hypothesized that plant growth is more dependent on nitrogen than CO <sub>2</sub> because if a plant has extra CO <sub>2</sub> in its atmosphere what good will it do the plant if it doesn't have the nutrients (nitrogen) to break that extra CO <sub>2</sub> down with? I also hypothesized that the plants grown with extra CO <sub>2</sub> and nitrogen would grow the best. <b>Methods/Materials</b> I tested this by having plants grow in four groups of several separate sealed containers (all in sandy soil at room temperature and watered the same amount). In one group, plants were tested for growth with double the amount of CO <sub>2</sub> , with nitrogen in the soil in another, both doubled CO <sub>2</sub> and with nitrogen in the soil together in another, and as my control, without nitrogen or extra CO <sub>2</sub> . I did one set of tests with pea plants (a nitrogen fixing legume) and one set of tests with lettuce plants (a legume). <b>Results</b> When the CO <sub>2</sub> in a pea plant's atmosphere was doubled, the plant grew about 10% taller (in three weeks) than when there was a regular amount of CO <sub>2</sub> . The pea plants grown with doubled CO <sub>2</sub> were also thicker, healthier, and had deeper root systems than those of the control plants. The lettuce plants grown with doubled CO <sub>2</sub> grew an average of 45% more (in weight) than the control and had slightly longer root systems. The plants, both pea plants and lettuce plants, with nitrogen in the soil and no extra CO <sub>2</sub> all died. However, in the containers with a doubled amount of CO <sub>2</sub> and with nitrogen, the plants survived and, although they didn't grow as well as the control group, grew fairly well. <b>Conclusions/Discussion</b> From this project, I can conclude that plants grown with a higher amount of CO <sub>2</sub> grow healthier, taller, and structurally differently than when without. I think the plants with nitrogen in the soil died because there was too much of the nitrogen. It was interesting to see that the plants with nitrogen in the soil and a doubled amount of CO <sub>2</sub> survived. This just goes to show how important CO <sub>2</sub> is in plant growth (and survival), and unlike my hypothesis, plants without nitrogen seemed to grow just fine, especially with extra CO <sub>2</sub> .	
<b>Summary Statement</b> This project showed that plants grow bigger and healthier with a doubled amount of CO <sub>2</sub> even if there are no nitrogen nutrients in the soil and that CO <sub>2</sub> can save a plant grown in toxic soil.	
<b>Help Received</b> My science teacher Ms. Chu helped me proofread my report. My parents helped me financially and by driving me around town to get materials and the board for my project. My dad helped me set up the plant lights and supervised the CO <sub>2</sub> injections.	