

**Greater San Diego Science and Engineering Fair
2017 PROJECT SUMMARY**

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Project Title: The Effect of Gases on Plants

Objectives/Goals: The objective of this experiment is to understand how gases will affect the growth rate of bush bean plants.

Hypothesis: It is expected that the plants subjected to the gases will have a retardation in their growth, due to the fact that there will be too much of it. The hypothesis for this project was that the additional exposure to carbon dioxide gas would reduce the growth of the bean plants by 20% as compared to the control bean plants which were grown without additional gases. The nitrous oxide would reduce bean plant growth by 10%.

Methods/Materials: The plants were separated into 3 different groups, the carbon dioxide, nitrous oxide and the control group. Each group had its own chamber, which was airtight, so that the plants were not influenced by outside air. The first two groups were exposed to their corresponding gases, while the control group was not exposed to any gas. The seeds were planted exactly 1 inch into the soil and they were watered once a week with cold water. The measurements of each of the plants for all the chambers were taken for 7 weeks. They were exposed to 12 hours of light a day, to simulate an outside environment, and kept in a closed room. Leaf and stem descriptions were also taken, once a week throughout the experiment.

Results: In the first two weeks of the experiment, the carbon dioxide group had slowed the growth of the plants 8.8% and the nitrous oxide has slowed the plants' growth down 24.6%. By the 4th week, the retardation of growth in the carbon dioxide plants had increased to 0.25%, but the retardation of the nitrous oxide plants had reduced to 5.7%. The plants grew 0.25% slower than the control group of plants. The nitrous oxide group grew 4.3% slower than the control group of plants.

Conclusions/Discussion: The hypothesis of this experiment was tested wrong. The hypothesis expected the carbon dioxide plants to have a much greater effect on the plants, exactly 20%, but the carbon dioxide only affected the plant 0.25%. This was not expected at all. The nitrous oxide was predicted to retard the growth by 10%, but ended up only retarding it 4.3%. The control group was compared with the other two groups for the stems and leaves of the plants. Although, it was not hypothesized, the plants were not expected to droop. The leaves weren't expected to turn yellow and eventually start falling off.

Summary Statement: This project was the testing of how carbon dioxide and nitrous oxide affected bush bean plants, which was compared to the control group that didn't have any gases to influence them. It was concluded that nitrous oxide had a 4.3% retardation on the plants, which was a lot more than the plants for the carbon dioxide. Those plants were only growing 0.25% slower.

Helped Received: The help that was received was from the parents of the experimenter, who helped her let out the gases every week and set-up the experiment in the beginning.

