CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
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Project Number
31368

Project Title
Carbon Dioxide: It's a Killer!

Abstract

Objectives/Goals
The objective was to investigate the impact of increased concentrations of greenhouse gases such as CO(2) on C3 plant germination and growth (height and mass). I hypothesized that significant increases would be detrimental.

Methods/Materials
Bean seeds were planted in four sealable gallon glass jars with equal amounts of soil and water. Increasing amounts of CO(2) were injected into three of the four jars using a hypodermic needle. The jars were sealed to create environments in which the CO(2) levels were normal (330 ppm, or .03 percent) and 2440, 4550, and 6630 ppm (7.4, 13.8, and 20.1 times normal levels, respectively). Plant heights were recorded for twenty days. Plants were then removed from the jars, dried, and weighed.

Results
Average plant height increased by 15 percent in the environment with 7.4 times normal CO(2) levels, and decreased by 15 percent and 64 percent, in that order, in environments with 13.8 and 20.1 times normal CO(2) levels. Total plant mass decreased by one-third as CO(2) levels increased from 2440 to 4550 ppm.

Conclusions/Discussion
While some increase in atmospheric CO(2) levels fosters C3 plant growth, that benefit becomes a detriment to growth as CO(2) levels continue to increase. Practical application of these results could include extracting CO(2) from the atmosphere to enhance plant growth and shorten time to harvest.

Summary Statement
My project explores the impact of increases in atmospheric CO(2) levels on the germination, average height, and mass of beans, a C3 plant.

Help Received
Stepfather helped me find a solution for sealing jars and helped me inject CO(2) into jars. Mother helped me calculate atmospheric CO(2) levels, helped type and format research paper, and helped develop double line graph comparing results to Neales and Nicholls'.