



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>Kiira J. Johal</b>	<b>Project Number</b> <b>S1607</b>
<b>Project Title</b> <b>Determining Which Percentage of Nitrate in Fertilizer Will Yield the Greatest Height in Vigna unguiculata</b>	
<b>Objectives/Goals</b> The purpose of this project is to determine whether varying percentages of nitrate in fertilizer will affect the height of Vigna unguiculata.	
<b>Abstract</b> <b>Methods/Materials</b> The percentage of nitrate in fertilizer acted as the manipulated variable while the height of each plant served as the responding variable. Fertilizer solutions with the analyses of 0-5-5, 3-5-5, 6-5-5, and 12-5-5 were produced. The required quantity of diammonium phosphate was added to warmed water. After that amount had dissolved, the required amounts of potassium chloride were added. After this step was completed an additional three times, correct amounts of urea were added to each solution. After the urea had dissolved, water was added until each of the four solutions reached a mass of 680 grams. 340 grams of potting soil were massed and placed in four large plant containers. Each plant container represented the various fertilizers. Twelve cowpea seeds were placed in each container, and 50 mL of each fertilizer was applied to the corresponding container a total of three times throughout the experiment. The plants were watered with 200 mL every three days and height measurements were taken daily.	
<b>Results</b> The plants exposed to fertilizer containing 12%, 6%, 3%, and 0% nitrate grew to the heights of 7.50, 6.29, 5.76, and 6.00 cm, respectively. Final deviation percentages show that the plants exposed to 0% nitrate deviated by 14.7% and the plants exposed to 3% nitrate deviated by 21.9%. Lastly, the plants exposed to 6% nitrate deviated by 23.4%, and the plants that received 12% nitrate deviated by 14.5%.	
<b>Conclusions/Discussion</b> The results for the plants containing 12% and 6% nitrate were expected because they contained the two greatest quantities of nitrogen, an essential element in stimulating plant growth due to its role in protein building and photosynthesis. The finding that the plants that received 0% nitrate outgrew those that received 3% was unexpected, and may be explained because there was not a great enough differentiation between the percentages of nitrate. The high percentages in deviation could have been affected by the outliers present in the data or volatilization. Volatilization was attempted to be deterred with appropriate application methods, yet arose as a flaw in the experimental design.	
<b>Summary Statement</b> This project served to observe whether a relationship can be stated between the percentage of nitrate in fertilizer and the growth of a plant.	
<b>Help Received</b> Doctor Sarjit Johal provided the chemicals and calculations necessary to produce the four various fertilizer solutions.	