



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

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Project Title Phase III - A Study of the Effect of pH on Mitochondria: A Practical Application with Daytona (Bush) Beans	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine which solution, acidic, neutral, or basic, will affect the growth of Daytona (Bush) Beans most positively.</p> <p>Methods/Materials Daytona (Bush) Beans were exposed to different solutions: acidic, neutral, and basic. For a period of 30 days, they were grown. Once viable, germinating seeds reached the 30 day period, samples were taken from the plants and run through the #Tracking ATP Production Rate of Mitochondria Protocol,# using a Janus Green B stain and spectrometer, to track relative mitochondria activity.</p> <p>Results Half of the plants nourished with an acidic solution grew, 75% of the plants nourished with a neutral solution grew, and 0% of the plants nourished with a basic solution grew. Samples from the acidic plants had an average absorbency of 0.002 A. Samples from the neutral plants had an average absorbency of 0.035 A. There were no basic plant samples, since none germinated. Pre-test lab data shows that celery cells tested with an acidic solution continually rose in absorbency level, reaching up to 0.042 A. The neutral celery cells remained stable throughout at 0.002 A. The basic celery cells had an initial jump to 0.012 A, but then eventually dropped to 0.005 A.</p> <p>Conclusions/Discussion Janus Green stains active mitochondrion cells, which allows a spectrometer to detect ATP production activity. When the spectrometer measures absorbency, it also measures the amount of activity. This means that the greater the absorbency, the greater the amount of activity of the mitochondria. The greater amount of activity of the mitochondria signifies that it produces more ATP. The results do not directly support the conclusion that an acidic solution most positively impacts the rate of ATP production in mitochondria. While not all of the plants nourished with an acidic solution grew, the acidic plants that did grow exhibited growth qualities that were more positive than the neutral or basic plants. The results leave open avenues for testing specific levels of acidic pH on the growth of plants.</p>	
Summary Statement The project is about using the "Tracking ATP Production Rate of Mitochondria" to assess the practical application of growing plants nourished with different pH solutions.	
Help Received Received biological stain from La Sierra University; Mr. Newton provided validation for theory behind project design; used lab equipment at Centennial High School.	