



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Sydney L. Marler	Project Number J1914
Project Title The Effect of the Strengths of Electromagnetic Fields on Various Characteristics of Garden Bean Development	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective is to discover what effect the occasional presence of electromagnetic fields of varying strengths have on aspects of height, width, and pigment of a garden bean plant indoors in partial sunlight.</p> <p>Methods/Materials Using 3 "seed starting" containers with ten soil pods and dividers, I planted 30 Garden Bean seeds exactly 1 centimeter into the soil. I constructed a copper wire apparatus (wrapped 6x around the Group A container and 4x around the Group B container). Both copper wires were connected to an "on/off" switch and powered by a battery. One container had no electromagnetic field apparatus and was referred to as the control group. All plants were given the same amount of water on the same days and the temperature never fell below 72 degrees. Each day, between the hours of 5 and 8 pm the electromagnetic field was "on" for exactly 30 minutes. This occurred for six weeks, taking observations and photos every Sunday.</p> <p>Results When the experiment was conducted, there proved to be a tremendously noticeable growth speed in plant Group A. At week 4 of development, Group A's average height was substantially different from Group B or C. At the end of six weeks, Group A was 33% taller on average than Group B and 31% taller than Group C. Group C was a close 2% taller than Group B on average. In terms of width, Group A was 36% wider on average than group B and 34% wider than Group C. Again, Group C was 2% wider than group B. A total of 12 bean seeds showed no growth in height or width and were possibly losing out in competition for water with bigger plants. Pigment results were as expected and did not seem to have any correlation to the electromagnetic fields. The majority of plants had a medium green pigment. Several plants lost pigment as the experiment progressed, but it was evident that taller plants prevented proper chloroplast production with sunlight.</p> <p>Conclusions/Discussion My conclusion is that the strongest electromagnetic field in group A impacted the plants' productivity and speed significantly compared to other plant groups. However the slight increase in growth in group C compared to Group B could be a result of a minimal changes such as the placement of plants or Group C receiving a byproduct of the nearby electromagnetic fields.</p>	
Summary Statement I researched the effects of occasional electromagnetic fields on Garden Bean plants in terms of height, width, and pigment.	
Help Received Father and Mother funded experiment: Father turned "on" the electromagnetic fields while I was away.	