



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

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| <b>Name(s)</b><br><b>Shivani Gupta</b>   | <b>Project Number</b><br><b>S1803</b> |
| <b>Project Title</b><br><b>Exploring the Relationship between the Duration of Electrical Voltage and Plant Growth</b>  |                                       |
| <b>Objectives/Goals</b><br>The purpose of the project was to determine the effect of the duration of electric field on tomato plant growth. It has been established through research that the presence of an electric field has a positive effect on plant growth. It was hypothesized that there is a direct relationship between the duration of electric field and plant growth and that twenty-four hours of electric field per day would stimulate plant growth the most.   |                                       |
| <b>Abstract</b><br><b>Methods/Materials</b><br>Tomato seeds were germinated in soil and subsequently, plants were exposed to electric field at five different levels: A (4 hours electric field daily), B (9 hours), C (15 hours), D (24 hours), and E (0 hours, control). Electric field was generated using two 9V batteries connected in parallel and galvanized steel nails as electrodes. Plant height was measured weekly for 70 days, and at the end of the experiment, plant tissue testing was conducted at a local agricultural laboratory to determine the concentration of nutrients in the treated and control plants.  |                                       |
| <b>Results</b><br>Every treated plant group maintained an average height taller than that of control throughout the experiment. This range of increase in plant height (compared to control) was 10-55%. Based on the Analysis of Variance test, plant groups A and D performed the best, plant groups B and C ranked second in growth, and plant group E exhibited slowest growth. There was no notable difference in nutrient amount between treated (plant tissue consolidated from the electrically treated plants) and control plants. The concentration of various nutrients in the treated and control groups remained within the preferred ranges provided by the lab. |                                       |
| <b>Conclusions/Discussion</b><br>The hypothesis was partially correct. Although plant group D (24 hours of electricity daily) yielded in the highest average plant height, there was no significant difference in plant height between plant groups A and D. With plant nutrient analysis, we can conclude that plants treated with electricity contained the adequate concentrations of essential nutrients necessary for optimum growth. This electrical treatment presents an eco-friendly method to accelerating plant growth and increasing crop yield.   |                                       |
| <b>Summary Statement</b><br>This project aims to determine the effect of the duration of electric field on tomato plant growth.  |                                       |
| <b>Help Received</b><br>I would like to thank Mr. David Wechsler, founder of Electric Fertilizer, for being my mentor for this project and the Agriserve lab for providing the plant tissue tests.   |                                       |