



# CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

<b>Name(s)</b> <b>Shivani Gupta</b>	<b>Project Number</b> <b>S1913</b>
<b>Project Title</b> <b>It's Getting Toxic Here!</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose was to determine the allelopathic effect of juglone on the growth of vegetable plants. Allelopathy is the beneficial or harmful effect of one plant on another plant through release of chemicals. In this experiment, juglone is used as the chemical, found in different parts of the California Black Walnut tree. It has been suggested in scientific literature that plants having shallow root systems are more tolerant of juglone than deep-rooted species. Thus, the Solanaceae family of plants would be adversely affected by this allelochemical. Corn and bean plants are both shallow-rooted crops. Further, bean plants are known to improve soil fertility. Thus, the hypothesis was that tomato plants would be most affected, and bean plants would be least affected by juglone.</p> <p><b>Methods/Materials</b> 5 seeds of each plant, tomato, bean, and corn, were placed in 9 Petri dishes. Juglone solution was prepared by grinding walnut tree leaves with distilled water. Seeds of each plant were treated with three different concentrations of juglone solution: 0% as the control, 10% and 50%. After initial treatment, seeds were watered every day over a period of 7 days. Seed germination and plant height were recorded on a daily basis for each seed. 2 repeat trials were conducted for each plant.</p> <p><b>Results</b> Data for this experiment was analyzed by taking the averages from each experiment for each plant in terms of seed germination and plant height. The results showed that tomato plants were most adversely affected, showing reduction in seed germination and plant height with increasing juglone concentration. Bean plants treated with 10% juglone showed results very similar to the control. Corn plants with 10% and 50% concentrations of juglone showed decrease in plant growth but to a less severe extent.</p> <p><b>Conclusions/Discussion</b> The hypothesis was correct. Since juglone was taken in by the tomatoes, they were unable to retrieve sufficient nutrients. On the other hand, the bean plants have shallow-rooted systems, allowing them to effectively obtain nutrition. We can use the allelopathic property of juglone to suppress weeds. Many of the weed population come from the Solanaceae plant family, like the nightshade species. Juglone can replace synthetic herbicides and prevent soil pollution. Allelopathic crops can be used as smother crops, crops specifically cultivated for weed suppression, or in companion cropping.</p>	
<b>Summary Statement</b> This project determines the allelopathic effects of juglone on the seed germination and height of vegetable plants.	
<b>Help Received</b> My father helped me with ordering the plant leaves and making the graphs for the experiment.	