



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Kristen F. Fukunaga</b>	<b>Project Number</b> <b>J1708</b>
<b>Project Title</b> <b>The Allelopathic Properties of Black Walnut Hulls</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Black walnuts (<i>Juglans Nigra</i>) are allelopathic trees that release toxic chemicals to poison neighboring plants. The purpose of my project is to observe the effects of black walnut hulls on seed germination and radicle growth and to find out if different concentrations of black walnut extract will prevent seeds from germinating in my garden.</p> <p><b>Methods/Materials</b> Ten seeds of seven plant species were placed in petri dishes with 5 ml of the different test solutions (1%, 2.5%, 5%, 10%, 20% concentration of black walnut hull extract) and a control with only distilled water. This dose/response bioassay was replicated 5 times. Seed germination rate, radicle length, germination index, toxic concentration (TC-50), and variance were calculated after seven days.</p> <p><b>Results</b> Seeds in the control plate germinated faster and grew longer roots. Lettuce, cabbage, tomato, and beet were the most susceptible to juglone, the toxic allelochemical released by black walnuts. Radish and onion were more tolerant to juglone and their germination was not inhibited but may have been delayed (smaller roots and cotyledons), garden bean was the most resistant to black walnut hulls.</p> <p><b>Conclusions/Discussion</b> The hypothesis that lettuce, radish, garden bean, tomato, cabbage onion, and beet seeds won't germinate or grow as well when in contact of black walnut hull extract is supported by the data. The general trend showed that toxicity of the test solution increased with higher concentration. However, some plants might be more resistant (garden beans) or tolerant (radish and onion) to black walnut hulls. This experiment is relevant to landscapers and gardeners to assure survival of plantings. A research on the active compounds of black walnuts can help develop natural herbicides for farmers.</p>	
<b>Summary Statement</b> The purpose of this experiment is to study the allelopathic effects of black walnut hulls on seed germination and radicle growth.	
<b>Help Received</b> My parents bought the materials, and my mom helped with the board layout. I would like to thank Mrs. Anderson and Dr Oliver for their guidance.	