



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Kevin Y. Huang	Project Number S1711
Project Title The Combined Effect of Heat Stress and the Oxidative Stressors Juglone and Paraquat on Caenorhabditis elegans Survival	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In the environment, multiple environmental stressors interact and challenge an organism's ability to maintain homeostasis. Little is understood about how an organism maintains homeostasis when exposed to multiple abiotic stressors. In general, interactions of multiple stressors can be categorized by three models: addition, synergism and antagonism. To figure out which model holds true and how consistent is this relationship, the model organism <i>Caenorhabditis elegans</i> was exposed to two environmental stressors: heat stress and oxidative stress. The project is a simulation of how multiple environmental stressors will affect an organism in extreme climate cases such as a heat wave, where the temperature is suddenly raised.</p> <p>Methods/Materials To induce oxidative stress, the organisms were exposed to juglone and paraquat, and their interactions with heat stress (four temperatures versus 6 different concentrations of chemicals) were compared. The exposure time is 4 hours, followed by a 24 hour recovery time.</p> <p>Results In the juglone experiment, as the temperature and concentration of the juglone experiment increased, the survival rate decreased. In the paraquat experiment, as the temperature and concentration increased, the survival decreased as well. In both trials, the differences between the control trial (low temperature, highest juglone concentration + highest temp., lowest concentration) and the experimental trial (combination of highest temp. and concentration) were significant (juglone, $p < .001$; paraquat: $p < .25$).</p> <p>Conclusions/Discussion A synergistic interaction between both oxidative stressors with heat in affecting the survival of <i>Caenorhabditis elegans</i> was observed. However, the synergistic interaction between paraquat and heat is less obvious and it takes higher amount of paraquat (a 1000 times more) to induce the same mortality level as juglone would induce with heat.</p>	
Summary Statement Synergistic interaction between multiple environmental stressors (heat and oxidative stressors juglone and paraquat) was tested and confirmed on the nematodes <i>C. elegans</i> .	
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