



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) S. Annika Daug	Project Number J1707
Project Title Evaluating Curcumin As a Cytotoxic Agent Using a Germinating Seed Model	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project was to evaluate curcumin's cytotoxic effects using a germinating seed model. I hypothesized that germinating black eyed beans (<i>Vigna unguiculata</i>) exposed to curcumin would be affected adversely in a dose-dependent manner based on four parameters: extent of water imbibition, seed germination percentage, radicle length, and seedling weight.</p> <p>Methods/Materials Four sets of 30 black eyed beans were exposed to either water, low dose curcumin (LD) solution (2 mg/mL), medium dose curcumin (MD) (4 mg/mL), or high dose curcumin (HD) (8 mg/mL). Seeds were weighed, soaked for 3 hours in the corresponding solutions, then allowed to germinate in petri dishes under growing lights for 96 hours. Factors that would affect seed germination (such as ambient temperature, time exposed to light, volume of solution for watering) were kept constant. Parameters measured included weight of seeds after soaking, seed germination percentage, radicle length (using string method), and seedling weight after 96 hours. A total of 5 trials were done.</p> <p>Results Average percent weight gain of seeds after soaking for control, LD, MD, and HD were 110%, 103%, 102%, and 100% respectively. There was a 10% drop in water imbibition between control and HD. Seed germination percentage for control, LD, MD, and HD were 95%, 91%, 89%, and 83% respectively, with a 12% decrease between control and HD. Average radicle length after 96 hours for control, LD, MD, and HD were 68mm, 59mm, 58mm, and 57mm respectively. Average percent weight gain from dry beans to 96th hour for control, LD, MD, HD were 192%, 177%, 177%, and 172% respectively with a 20% drop between control and HD.</p> <p>Conclusions/Discussion Turmeric has long been used in Asian traditional medicine. In recent years, its active ingredient, curcumin, has been shown to have anti-cancer potential because it causes apoptosis in cultured cancer cells. This project evaluated curcumin's cytotoxic effects using a germinating seed model. The results showed that black eyed beans given water alone gained the most weight after soaking, had the highest seed germination percentage, the longest radicle length, and the highest seedling weight after 4 days of germination. Seeds exposed to high dose curcumin scored the lowest on all parameters. Dose dependency was demonstrated to a certain extent, although differences between LD and MD were small.</p>	
Summary Statement This project investigated curcumin's cytotoxic effects on germinating black eyed beans using varying concentrations of curcumin solutions+	
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