



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Samuel Z. Lang	Project Number S1717
Project Title The Toxic Effects of Teas as Pesticides or Repellents on Lumbricus rubellus, Genus Helix, and Genus Deroceras	
Abstract Objectives/Goals The purpose of this project is to evaluate the pH and toxic effects of various teas on earthworms, snails, and slugs, with the possibility of application as a natural pesticide or repellent. Methods/Materials Subjects: Earthworms, Snails, Slugs. Tea: Green, Red, Chrysanthemum. Teas were steeped in boiled water for a quick dip, 3 minutes and 10 minutes, producing test media: liquid, waste, and liquid mixed with peat moss (simulation of liquid contamination in soil). pH was recorded for all media. Tested subjects were kept in containers holding test medium. Subjects were observed for health, motility, mortality, and weight change, status recorded and photographed. Two test formats were introduced: Direct Contact and Island. Direct Contact involved prolonged exposure to test media, showing immediate effects on behavior, motility, and health. Island format tests the medium's effects as repellent: the subjects are placed in safe areas allowed to remain or be exposed to medium. Results Both green and red tea liquids in all concentrations tested are lethal to all tested subjects, killing slugs within 10 minutes, snails within half hour, and worms within a few hours. Green and red tea waste in all concentration tested are deadly to slugs and worms in prolonged contact. Snails make epiphragms, emerging only when danger has passed. Both Green tea and Red tea liquid in high concentration mixed with peat moss is lethal to earthworms. However, they only showed little effects on slugs and snails. Island tests showed that slugs and snails do occasionally cross the lethal media. Although island may provide safe area, tested subjects eventually enter test media, expiring Conclusions/Discussion Liquid form of high concentration green or red tea proved most lethal for snail and slugs, and can be used as natural pest control or repellent. However, peat moss (mock soil) contaminated with green tea or red tea liquid is lethal to earthworm (which is an undesired complication, earthworms being a beneficial species). Therefore, it may be better for the garden if green or red tea liquid is applied to point sources to protect select plants from snails and slugs, minimizing harm to earthworms. Although green tea waste and red tea waste can kill slugs and earthworms and harm snails upon prolonged direct exposure, some of the tested gastropods passed through the "hot zones" with little difficulty to the container walls, utilizing massive amounts of slime to protect themselves from the testing media. There is no direct correlation between pH and toxic effect of various tea media.	
Summary Statement Green or red tea served as effective natural toxins and repellents to snails, slugs, and earthworms, especially in concentrated liquid form, but point sources are recommended for application, so to minimize harm to worms.	
Help Received Parents provided materials, brewed tea and helped build board	