



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

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<b>Project Title</b> <p align="center"><b>Tea or Copper? Environmentally Friendly Repellents for Helicid Snails and Deroceras Slugs</b></p>	
<p align="center"><b>Abstract</b></p> <p><b>Objectives/Goals</b>          This is my 4th year of science experiments on worms, slug/snails. Previously, I discovered that tea, especially the liquid form of high concentration of green/red tea, is lethal to most invertebrates; tea is also a better repellent than carbaryl/metaldehyde-based molluscicides (pests that ate the poison bait may still eat plants before death). The purpose of the current project is to compare copper tape vs. tea waste leaf liquid, to discover which is more effective environmentally friendly gastropod repellents in protecting delicate plants from gastropod pests.</p> <p><b>Methods/Materials</b>          Subjects: Helicid Snails (pomatia and aspersa), Deroceras Slugs (reticulatum, agreste, etc.) Repellents: copper tape, high concentration tea waste leaf liquid (Green/Red). The repellent tray is required for liquid application; it prevents tea from leaching into the soil and harm earth worms. Build the tray with a spacious central safe area surrounded by a three inch wide repellent zone lined with copper tape or filled with a thin layer of tea, then place desired seedlings around the tray.          Testing: place subjects in central safe area with a wet paper towel for sustenance. Observe and document subject activity with camera, record data for subject escape, condition, interaction with repellent, and damaged plant count. Repellent performance is gauged by subject escape rate.</p> <p><b>Results</b>          The escape rate on copper were 15 to 25+, and damaged plant rates varied from 3 to 20+ in 8hr testing period. In contrast, there were almost no escapes and damaged plants with both red/green tea tests. It is beyond a statistical doubt that both tea waste leaf liquids (high concentration) were superior repellents and molluscicides.</p> <p><b>Conclusions/Discussion</b>          Although there was obvious hesitation upon contacting copper, both slugs and snails could pass through the copper zone and enter the plant area without being visibly harmed. Saponins, caffeine, and tannins are possible toxic substances in tea. All slugs immersed in tea died. Snail clusters often lost balance and toppled into tea zone. If shell in first, snails would have a chance to return to safety. Rarely, snails may escape by using other stricken snails as #stepping stones,# which may be prevented by increasing the depth of tea level. In conclusion, Tea Waste Leaf Liquid (high concentration, both kinds) is a more effective snail/slug repellent and molluscicide compared to copper tape.</p>	
<p><b>Summary Statement</b></p> <p>This project compared two environmentally friendly alternative gastropod repellents/molluscicides applied to protect delicate plants, and found that tea waste leaf liquid was a better repellent than copper tape.</p>	
<p><b>Help Received</b></p> <p>Parents provided materials, and boosted morale. My schoolteacher Mr. Hammond told me how to apply to the CSSF.</p>	