



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Sidharth Bommakanti	Project Number 34424
Project Title The Effectiveness of Eucalyptus globulus Extract as an Insect Repellent	
Abstract Objectives/Goals This project was created in order to further understand the specific compounds in eucalyptus globulus extract that cause its insect repellent properties, how those components differ between three different age groups, and how those differences affect the plants ability to display insect repellent properties. Experiments were conducted to identify which age group most dominantly exhibits insect repellent properties, and what individual components were responsible for causing those properties. Methods/Materials Leaves were harvested from 3 Eucalyptus globulus trees, one set of coppice leaves from a stump cut a year ago and leaves from 2 different young trees <6 in in diameter, estimated to be less than 6 years old. 50 mg of crushed leaves were weighed into tubes. 1.5 mL of hexane was added to each tube and tubes vortexed briefly and then sonicated for 15 min. An autosampler was used to inject 0.5 µL of sample into the 50° C injector port which was ramped to 270° C in 12° C/s increments and held for 3 min. Volatilized metabolites were separated using an Agilent 7890 gas chromatograph, controlled by Agilent GC/MS MassHunter Acquisition software. Results Experiments were conducted to identify which age group most dominantly exhibits insect repellent properties, and what individual components were responsible for causing those properties. α -cadinene, nerolidol-2, geraniol, and L-alpha terpenol were identified as compounds most directly responsible for the insect repellent properties of the eucalyptus plants. The chemical compounds were identified via Gas Chromatography/Mass Spectrometry analysis. Conclusions/Discussion The results of the GC/MS analysis and bacterial testing confirm and further elucidate the insect-repellant properties of the Eucalyptus Globulus plant. Structural analyses revealed the presence of multiple terpenes in all Eucalyptus Globulus leaves. A proposed mechanism of action involves the carbon skeleton of terpenes, which is said to have an effect on the olfactory genes OR43B and OR83B. This prevents insects from sensing the smell of prey and causes them to fly away without noticing the prey's natural odor.	
Summary Statement Analyzing the effectiveness of Eucalyptus Globulus extract as an insect repellent based on its specific chemical components.	
Help Received Used lab equipment at Lawrence Berkeley National Lab of Stefan Jenkins	