



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Eugene Laksana	Project Number S1799
Project Title Contrast. Eff. of Comp. Plant Ext.& Commercial Neonicotinoid in Regulating W.F Inhab. of Verbena& Tomato Plants Yr. 2	
Abstract Objectives/Goals Colony Collapse Disorder has grown in prominence since 1919, now accrediting for losses as much as 40-50% of honey bees in some European countries during the winter of 2012. The primary culprit of the disease is the abuse of neonicotinoid, known to be acetylcholine receptor agonists. The objective is to develop a new system of pest control that substitutes the usage of neonicotinoid through the integration of the repelling properties of concentrated volatile plant extracts and an improved variation of trap cropping. Methods/Materials Five verbena and tomato plants were each stripped down to two leaves and contained in separate testing chambers, where they were treated with either 25% or 75% concentrated <i>C. officinalis</i> or garlic/pepper topical solutions. Water served as a neg. control. 25 separately bred whiteflies were then sealed into each chamber and placed under constant overhead lighting and surveillance for 10 hours. Still-shot images were taken at 30 minute intervals via web cameras, and data was collected by counting the number of whiteflies occupying both leaves at each interval. This experiment was replicated five times on consecutive days. Results Though the <i>C. officinalis</i> solution at 75% concentration appeared to produce optimal results, a 3% difference in efficacy with the <i>C. officinalis</i> solution at 25% concentration should not warrant a tripling in the cost of production. The garlic and pepper solutions at both concentrations produced significantly inferior results to the <i>C. officinalis</i> solutions at either concentration, but they still developed trends that suggested a common factor was responsible in repelling the whiteflies from both tomato and verbena plants. Conclusions/Discussion An unexpected 89.2% efficacy from 75% concentrated <i>C. officinalis</i> extract occurred. Because repellency, is more likely than mortality to affect subsequent generations of whiteflies, the solution, if properly employed, can potentially develop generations of whiteflies bred to avoid target crops while negating the side effects induced by neonicotinoid. However, further studies regarding the life spans of these volatile solutions and a possible presence of an olfactory system in whiteflies must be conducted. Ultimately, careful and possible integration of repellents into trap cropping techniques will ideally redevelop pests to target decoy plants, rather than primary vegetation.	
Summary Statement This project aims to form a fourth generation of pest control by integrating solutions based off of concentrated volatile plant extracts and redeveloped trap cropping to substitute the use of commercial neonicotinoid.	
Help Received Dr. Deborah M. Mathews from UCR helped supply reagents and provided mentorship throughout the duration of the project.	