



CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

Name(s) Wilder Bunke; Han Kim; Karl Marrett	Project Number S0903
Project Title When Growing Orange Goes Green	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals We tested to see which street trees are most effective in removing atmospheric carbon dioxide and the pollutant ozone, testing the broad spectrum of Palm, Pine, and Oak. We also wanted to know the environmental benefits of orange groves, the extent of their decrease over time, and ultimately the carbon value of a grove.</p> <p>Methods/Materials For the core of our data, we used a Gas Exchange System created by Licor. This gave us conductance and photosynthetic rates which we used for our wintertime data (for orange we used a diurnal curve) and used cited summertime data for each species. We then found the leaf area from each species used a planimeter to trace the leaves out, then estimated leaves per tree. We also experimented with a program called STRATUM but we disregarded these numbers for various reasons. For orange, in particular we used three aerial photographs of Redlands to trace out the areas of orange groves within city limits. Afterwards, we traced these areas with a planimeter then scaled from ground counts to find the approximate amount of trees in Redlands during those three years.</p> <p>Results Due to its high ozone uptake and decent sequestration Oak is the best overall tree species of the ones we tested. Pine does have the highest carbon dioxide but due to its low conductance had weak uptake of ozone. Palm had low leaf area and was a poor street tree Orange did decently in both areas we tested.</p> <p>Having one metric ton averaging twenty dollars, in 1959, when there were 3,357,760 orange trees within the city limits of Redlands, which would have brought in roughly \$100,733 in carbon credits for the city. In 2005, there were 959,056 trees, which diminished the revenue from annual carbon sequestration to \$28,771.</p> <p>Conclusions/Discussion While Oak trees may be best as an overall subjects such as maintenance, water usage, and VOC emission of the species should be taken into account for. Orange groves, which are environmentally and economically beneficial, are decreasing rapidly. In order to slow, stop, and hopefully even re-inflate these grove areas, Jon Harrison (the mayor of Redlands), using our new data of orange grove carbon credits, is hoping to discourage this disappearance of these precious groves by getting carbon credits for them as well as enforcing mitigation for the carbon sequestration lost when a grove is destroyed for infrastructure.</p>	
Summary Statement On a botanical basis, what are simple ways for a city to improve atmospheric benefits.	
Help Received Nancy Grulke taught and supervised use of the gas exchange system and introduced the program STRATUM as well as answered miscellaneous questions related to our project. Jon Harrison provided us with aerial photographs. Eric Bunke provided and supervised use of the planimeter. Finally, Kelaine	