



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <p align="center"><b>Sophie J. Parsa</b></p>	<b>Project Number</b>          <p align="right">35182</p>
<b>Project Title</b> <p align="center"><b>Trees: Family or Foe?</b></p>	
<p align="center"><b>Abstract</b></p> <p><b>Objectives/Goals</b>  The goal of this project is to see how the size of an investigated area of land affects the evidence of habitat filtering and competitive exclusion. I looked at different quadrat sizes on a plot of land at UCSC (the FERP database) and used the program R to examine the phylogenetic distances of the plant present in the quadrat. My hypothesis is that as the quadrat decreases in size competitive exclusion becomes prevalent.</p> <p><b>Methods/Materials</b>  *PD=phylogenetic distance, All quadrats are in m<sup>2</sup>  Materials - I used the computer program R, the UCSC FERP database of plants, a phylogenetic distance matrix and phylogenetic tree for the species on the FERP plot.  Methods-  1.Load data files into R: FERP database, PD matrix, taxonomy file  2.Observed Data: Loop through all possible quadrats of the sizes 5m, 10m, 20m, 50m, 100m each time finding the 10% quantile PD (observed10Q) for the plants in the given quadrat.  3.Random Data: Then for each quadrat, loop 1000 times, each time finding the 10% quantile PD from a group of randomly selected plants(of the same number as found in the observed quadrat).  4.Store number of random 10% quantiles &lt;= to Observed10Q/1000 (%randsmaller)  5.Make a histogram of %randsmaller for all quadrats of a given size  6.quadrats with %randsmaller &lt; median of histogram show habitat filtering and greater than median indicate competitive exclusion</p> <p><b>Results</b>  83% of the 100m quadrats show habitat filtering. 68% of the 50m quadrats show habitat filtering. 59% of the 20m quadrats showed habitat filtering. 64% of the 10m quadrats show competitive exclusion. 75% of the 5 meter quadrats show competitive exclusion.</p> <p><b>Conclusions/Discussion</b>  My hypothesis was correct. As quadrat size decreases, evidence of habitat filtering does as well. The largest quadrat size (100m) showed the most habitat filtering and the smallest (5m) showed the least. The 20m quadrat was the turning point where the distribution was almost 50-50 between habitat filtering and competitive exclusion. Finally, the complete shift to competitive exclusion is evident in the 10m quadrats.</p>	
<b>Summary Statement</b> This projects investigates evidence of competitive exclusion and habitat filtering in plants on different sized quadrats of land.	
<b>Help Received</b> Dr. Gregory Gilbert helped by answering questions and clarifying concepts. He also helped me write some R code.	