



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

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| Name(s) Sherry Y. Xu | Project Number S1814 |
| Project Title The Effect of Drought on California Native Plant Diversity | |
| <p style="text-align: center;">Abstract</p> <p>Objectives/Goals Determine how California native plant diversity is affected by varying drought conditions ("Low" water level, "Mid" water level, and "High" water level) over a 3.5 week testing period.</p> <p>Methods/Materials The experiment took place in an environmental chamber, which allowed me to keep temperature and light constant. I set up 18 germination trays, 6 of which were given "Low" water treatment, 6 were given "Mid" water treatment, and 6 were given "High" water treatment. Each tray contained 600 seeds: 100 seeds of each of the 6 California native species I chose for this experiment. I counted the number of germinants per each species in all 18 trays every 3 days throughout the course of 3.5 weeks. I used monocultures to help me identify the species of each germinant. I then used germinant count to determine diversity using metrics such as species richness and Shannon diversity.</p> <p>Results All calculations of diversity metrics revealed most diversity in "High" water treatments, and least diversity in "Low" water treatments. All one-way ANOVA tests for germination, species richness, Shannon diversity, and Simpson's Index yielded p-values of less than 0.01, showing significant differences between all 3 water treatment groups.</p> <p>Conclusions/Discussion The experiment found that germination and diversity are positively correlated with increased water treatment. The results support my hypothesis and indicate that increased drought conditions threaten native California plant diversity in terms of germination, species richness, Shannon diversity, and Simpson's Index. Additionally, by creating a linear mixed model with time, water, and the interaction between time and water, I observed a correlation between time, water, and diversity. Over time, species richness in "Mid" water level trays started to follow the trends of species richness in "Low" water level trays. I also observed that in the "Mid" and "Low" germination trays over time, there were some decreases in species richness, which suggest plant mortality, another possible drastic effect of drought on California ecosystems. Lastly, a comparison of Shannon Diversity and Simpson's Index results indicated that choice of metric plays a large role in determining diversity.</p> | |
| Summary Statement I found a positive correlation between California native plant diversity and increased water treatment, and also that over time, even "mid" water treatment has similar negative effects on plant diversity as a "low" water treatment. | |
| Help Received My mentor Dr. Barbara Fernandez-Going (D'Antonio Lab, UCSB) helped me with finding materials and taught me how to use PivotTable and JMP. This was an independent project; I designed/performed the experiment & analyzed data myself. The environmental chamber was at UCSB. | |