CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
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Project Number
36227

Project Title
Effects of Quercus engelmannii on Native vs. Invasive Plant Species

Abstract

Objectives/Goals
While at a nature preserve, I encountered the Engelmann Oak, or Quercus engelmannii, an endangered native tree. Since oaks produce tannins and some produce potential allelopaths, I wondered if the leaves could be used as an organic herbicide to inhibit the growth of nonnative species. I hypothesized that the Engelmann Oak tree might be effective in inhibiting the growth of nonnative species, but not inhibit the growth of native species.

Methods/Materials
I had two parts to this project. In the wild, I documented Engelmann Oaks and recorded the air temperature and humidity, and I tested for the soil temperature, moisture, pH, and light. I used a laser rangefinder to observe and record which plants grew in a 5 meter radius from the trunk, as well as to 10 meters. I compared the results, and repeated this process for Engelmann Oaks at three sites, The Daley Ranch preserve, Lake Hodges, and public areas near the road at Lake Hodges. I encountered a branch broken off a tree in a storm on a public street near Lake Hodges. I decided to experiment. I placed crushed Engelmann Oak leaves onto the soil of five different species of native plants, and five species of nonnative plants for a total of 30 plants. I observed and recorded the results for each plant, measuring the heights and taking note of the changes that occurred.

Results
In the Engelmann Oaks# undergrowth, I documented many native plants, including Lemonade Berry, Toyon Berry, Scrub Oak; Poison Oak, White Sage, and Black Sage. In my home tests, the leaves of the Engelmann Oak greatly affected the invasive grasses and shrubs, had a moderate effect on the ground cover, and had no negative effect on the White Myoporum. The leaves stimulated the growth of native Winter Current, and the other native species had an upward growth trend.

Conclusions/Discussion
The Engelmann Oak would make a strong candidate for a natural invasive-repellent, or herbicide, in the botanical realm. The outcome supported my hypothesis, that the leaves would have a lesser effect on native plants within the Engelmann Oak#s naturally forming plant community than on invasive species. This shows that the Engelmann Oak may be more effective in inhibiting the growth of invasive and nonnative species.

Summary Statement
My project examined the effects of the Quercus engelmannii, or Engelmann Oak trees' leaves as a natural herbicide on native vs. nonnative and invasive plant species.

Help Received
My science teacher provided equipment for this project, but all testing and recording was preformed by me.