CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
Anita Garg

Project Number
S1908

Project Title
The Role of Physiological Traits in the Restoration of the Coastal Sage Scrub Community

Abstract

Objectives/Goals
The goal of this project was to understand how native coastal sage scrub species' individual physiological traits impact their health and growth in various environments.

Methods/Materials
Methods: Species with differing environmental traits were observed in environments that induced various stresses and responses. The first variable altered was seeding style, in which the stomatal conductance and height of 48 Salvia apiana plants were observed in a mixed and shrubs-only seeding style. The second variable altered was seeding method, in which the chlorophyll content and height of six coastal sage scrub species were observed in seeded and planted plots. The third variable altered was slope aspect, in which the SLAs of roughly 50 samples each of Sonchus oleraceus, Eriogonum fasciculatum, Encelia californica, and Artemesia californica were measured on north-facing and south-facing slopes. The drought tolerance of Isocoma menziesii and Encelia californica was quantified through the observation of weight of water consumed and number of live and dead leaves throughout the course of the experiment.
Materials:
Instruments: Scientific oven, plant pots, wax paper, meterstick, scientific scale, decagon leaf porometer, SPADmeter.
Plants: 10 Isocoma menziesii plants, 10 Encelia californica plants; 48 Salvia apiana plants at the Loma Ridge Restoration Site; roughly 50 samples each of Sonchus oleraceus, Eriogonum fasciculatum, and Encelia californica from the Loma Ridge Restoration Site; Encelia californica, Salvia mellifera, Artemesia californica, Eriogonum fasciculatum, Baccharis emoryi, and Acmispon glaber plants at the Back Bay Science Center.

Results
It was observed that in a mixed seeding style, Salvia apiana had a higher stomatal conductance and lower height. Only Eriogonum fasciculatum had higher specific leaf areas on south-facing slopes. Encelia californica consumed more water and had more live leaves than did Isocoma menziesii throughout the experiment. Five of six species displayed greater height through planting than seeding.

Conclusions/Discussion
Extensive root systems lead to nutrient deficiency. Planted seeding methods encourage pre-developed root systems, which allow for greater plant growth; an exception to the pattern are pioneer species. Trichomes and small leaves lend species greater ability to conserve water. Mesophytic leaves encourage rapid water loss.

Summary Statement
I observed which physiological traits allowed certain coastal sage scrub species to respond uniquely to various environmental stressors.

Help Received
My science teacher Mr. Smay guided me through the steps of the scientific process.