Allelopathic Effects of Cynara cardunculus on Native Coastal Sage Scrub Species

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This project investigated how allelopathic compounds from the invasive Cynara cardunculus (artichoke thistle) affect native species in the endangered coastal sage scrub habitat (CSS) at Black Mountain, San Diego. With only 10–30% of the coastal sage scrub remaining and artichoke thistle present in at least 31 of California's 58 counties, its potential to disrupt native ecosystems is a growing concern. As the coastal sage scrub undergoes active restoration efforts across the state, understanding the mechanisms by which artichoke thistle inhibits native plant growth is crucial for developing effective mitigation measures. Therefore, this project focused on how leachates from fresh and decaying thistle roots, leaves, and soil affect the germination of key native species. Four experiments were conducted to assess germination success and germination time in response to leachate treatments. Using Generalized Linear Models (GLMs) and ANOVA statistical tests, the data revealed several key findings. First, germination success ($p = 0.0008$) and germination time ($p = 4.2e-5$) were variable across species type, with some showing higher tolerance than others. Second, all leachates significantly reduced germination proportion ($p = 1.02e-7$) but had no effect on germination time ($p = 0.71$). Third, no significant difference was found between leachate types (leaf, root, soil), with all p-values exceeding 0.15. Finally, leachate source (living vs. decaying) affected germination success depending on the species ($p = 0.017$) but didn't affect germination time ($p = 0.48$). Together, these findings illustrate the artichoke thistle's ability to disrupt the growth of native species, highlighting its threat to habitat restoration efforts.

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