

MECHANISMS OF INVASIVE SPECIES SUCCESS ACROSS RESOURCE GRADIENTS

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ABSTRACT

One of the most widely accepted hypotheses explaining the success of invasive plant species is the fluctuating resource hypothesis, which states that invasive species are facilitated by high resource (e.g., light, water, nutrient) availability. While most plant invasive species occur in highly disturbed, resource-rich environments, some invaders exist in lower resource habitats. If they are to succeed in these areas, they must compete with native plants that are adapted to these areas. I examined phenotypic plasticity and resource use efficiency as mechanisms of invasive plant species success in low resource systems. The work was conducted in Hawaii, which harbors a large number of invasive species and contains spectacular gradients of light, nutrient, and water availability, all on the same island. Working with phylogenetically related pairs of invasive and native species, I found no support that invaders are better able to respond to variation in resource availability through phenotypic plasticity, but this result varied across species.

I also found that invasive species are as efficient as natives in using limited resources, suggesting that species invading low resource habitats have traits similar to natives. This result contradicts the general paradigm that invasive species are opportunistic and display fast growth, with little resource conservation. My data suggest that resource use traits could be used in risk assessment models to predict which species may become invasive in resource-limited regions. These data also have potentially important implications for restoration and invasive species control programs. Namely, ecosystem manipulations that alter resource availability to favor the growth of native species may not work in some systems because low resource availability may actually favor the growth of invasive species with high resource use efficiency. Knowledge of resource use traits may be used to select native species for ecological restoration that could outcompete resource-efficient invaders.