Working title: Variation in herbivory across global environmental gradients

Current authors: Phil Hahn (Lead), Jake Herschberger, Ivalu Cacho, William Wetzel, Susan Whitehead, Karen Abbott, Andrea Galman, Nora Underwood, Brian Inouye, Lee Dyer, Emilio Bruna, Robi Bagchi, Daniel Anstett, Rupesh Kariyat, Carina Baskett

Abstract: Environmental gradients have a long history of shedding light on important ecological interactions, from global patterns in the strength of biotic interactions to regional variation in plant traits and herbivory. For example, mean herbivory tends to increase across large gradients in resource availability, growing season length, or latitude. However, correlations between mean herbivory and environmental factors are not always found, and when they are, they tend to be relatively weak. One fundamental aspect of plant-herbivore interactions that is often overlooked is the substantial inequity of how damage is distributed among plants within populations. Recently, patterns of variability in herbivory across latitude has been shown to be stronger than patterns of mean damage and can reveal important insights into factors regulating herbivory. Therefore, examining patterns of variability may provide additional explanatory power into the factors determining the strength of plant-herbivore interactions. Additionally, patterns of variability in herbivory, like patterns for the mean, are probably contingent on factors like type of gradient or plant traits, although this has not yet been explored. In this paper, we will develop and test predictions for how herbivory mean and variability should vary across multiple environmental gradients. We will examine how moments of herbivory (mean, variance, skew) vary across different types of environmental gradients, including climate, soil fertility, and land use. This work will expand previous investigations of interactions across gradients by focusing on metrics beyond the mean and multiple gradients.

Data: Phase I HV data

Response variables
Herbivory mean, variance, and skew measured at the population level (~600 surveys)

Predictor variables
1) Climate: Bioclim variables
2) Soil fertility: soils grid data
3) Land cover: from global land cover/use database and NDVI
4) Other gradients ???
5) Growth form: woody vs herbaceous

Authorship model
Traditional Plus. The lead author invites known individuals with value for the particular paper, plus a few people chosen from the HerbVar database as a good match for this project.

Timeline
Data processing: May – Dec 2024
Analyses: June 2024 – March 2025
Writing: Jan – June 2025
Submission: Summer 2025