

Null Models abstract for HerVar

Working Title: Null Models of Herbivory: what shapes distributions of damage?

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Abstract: We construct a series of null models that track the distribution of herbivore damage among plant leaves, individuals, and populations. These start from simple assumptions that populations consist of individuals and individuals consist of leaves; initially all leaves are identical and all plants and populations have identical numbers of leaves and individuals, respectively. When herbivore damage consists of small independent units of damage (“bites”) distributions of feeding damage are Poisson at the leaf-level and Gaussian for all higher levels of organization. As assumptions about independence and the uniformity of bites, leaves, plants, and populations are relaxed, distributions of herbivore damage become complex compounded distributions. We use a series of simulations to characterize these distributions of herbivore damage at different scales, which can be compared to data from the HerbVar project and help shape hypotheses about factors that shape distributions of damage on plants. Without null models as points of reference, it is difficult to interpret the biological importance of different amounts of variance.

Data: Simulation results, potentially some Phase I HV data for comparisons to simulation results.

Response variables: Simulation results. Herbivory mean, variance, skew, and Gini at the multiple levels of organization

Predictor variables: Plant size, leaf size

Authorship model: Traditional. The lead authors invite known individuals with value for the particular paper.

Timeline:

Initial discussions and coding: June 2024

Further coding and analyses: Nov 2024 – March 2025

Writing: Jan – June 2025

Submission: Summer 2025