Preregistration

My preregistration for the CIEE Productivity and Reproducibility Mini-Project

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Study Information

Title	Health of Sugar Maple (*Acer saccharum*) Seedlings in Response to Calcium Addition My preregistration for the CIEE Productivity and Reproducibility Mini-Project
Description	Acid rain leaches calcium out of the soil, a nutrient critical to the growth of the sugar maple (*Acer saccharum*). This lack of calcium leads to the soil turning more acidic, and creates a stressful environment for the species. We will use the Hubbard Brook Experimental Forest Sugar Maples (hbr_maples) dataset from the 'lterdatasampler' package to explore the addition of calcium on sugar maple seedling growth.
Hypotheses	If sugar maples rely on calcium, then plant growth metrics will be higher for the seedlings in the calcium-treated soil.

Design Plan

Study type	**Experimental Study**. Sugar maple seedling growth data is collected from study subjects in untreated and previously calcium-treated watersheds.
Blinding	No blinding is involved in this study.
Study design	The study design is a between subjects design with one factor (watershed) with two levels: calcium-treated (W1) or untreated (reference). There are six transects per watershed, and 20 samples per transect.
Randomization	Randomization was determined by Juice and Fahey (2019).

Sampling Plan

Existing data	**Registration prior to analysis of the data**. As of the date of submission, the data exist and you have accessed it, though no analysis has been conducted related to the research plan (including calculation of summary statistics).
Explanation of existing data	We have not taken any steps to analyze the data (including summary statistics) at this time.
Data collection procedures	Samples were collected between 2003 and 2004, in six transects per watershed treatment (W1 or reference), 20 samples per transect. All data collection procedures were determined by Juice and Fahey (2019).
Sample size	The target sample size for this data was 480 samples (2 watersheds x 6 transects x 20 samples x 2 years).

Variables

Manipulated variables	Juice and Fahey manipulated the addition of calcium to soil. The two levels of the watershed categorical variable are: calcium-treated (W1) and untreated (reference).
Measured variables	The outcome variables include: stem length, leaf area, leaf dry mass, stem dry mass, and leaf corrected area.
Indices	We will compare the mean growth metrics of seedlings in calcium-treated vs untreated soil.

Analysis Plan

Statistical models	We will compare mean sugar maple seedling heights at the two watersheds using a two-sided, two-sample t-test.
Transformations	The hbr_maples dataset does not require any additional transformations.
Inference criteria	We will use the standard $p<0.05$ criteria for our analyses.
Data exclusion	Minor data checks will occur, but outliers will not be removed as we are not familiar with the study subjects.
Missing data	If the subject is missing growth metrics they will not be included in the dataset
Exploratory analyses (optional)	We expect that the addition of calcium will be positively related to the sugar maple growth metrics. Therefore, we will look for relationships between growth metrics such as height-mass.