Preregistration

Effect of calcium addition on Sugar Maple seedling growth

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Note This document does not have citations inserted in the normal way (through Zotero plugin) because when I do so, the Rmd file fails to render. I am troubleshooting this for the final version of the miniproject, and for now have manually typed in in-text citations.

Study Information

Title	Effect of calcium addition on Sugar Maple seedling growth
Description	In this miniproject, I use the HBR maples dataset (Juice & Fahey 2019) from the lterdatasampler R package (Horst & Brun 2023) to study the effect of calcium addition on the growth of Sugar Maple (*Acer saccharum*) seedlings. Specifically, I ask the questions: Does calcium treatment affect (1) leaf dry mass and/or (2) stem dry mass? I use a simple t-test to look for a difference in these characteristics between seedlings that were on calcium-treated and reference sites.

Hypotheses

Alternative hypothesis: Calcium treatment affects Sugar Maple seedling growth (non-directional).

Null hypothesis: Calcium treatment does not affect Sugar Maple seedling growth.

If calcium treatment affects Sugar Maple seedling growth, there will be a difference in leaf dry mass and stem dry mass between seedlings sampled on the calcium-treated sites and those on the reference sites.

Design Plan

Study type

Experiment. A researcher randomly assigns treatments to study subjects, this includes field or lab experiments. This is also known as an intervention experiment and includes randomized controlled trials.

Blinding

No blinding is involved in this study.

Study design

(Juice & Fahey 2019) sampled seedlings on calcium-treated and reference sites using randomly placed transects. They collected data on various characteristics including leaf dry mass and stem dry mass, by sampling seedlings every ten steps.

Randomization

N/A

Sampling Plan

Existing data

Registration prior to creation of data. As of the date of submission of this research plan for preregistration, the data have not yet been collected, created, or realized.

Registration prior to any human observation of the data. As of the date of submission, the data exist but have not yet been quantified, constructed, observed, or reported by anyone - including individuals that are not associated with the proposed study. Examples include museum specimens that have not been measured and data that have been collected by non-human collectors and are inaccessible.

Registration prior to accessing the data. As of the date of submission, the data exist, but have not been accessed by you or your collaborators. Commonly, this includes data that has been collected by another researcher or institution.

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). A common situation for this scenario when a large dataset exists that is used for many different studies over time, or when a data set is randomly split into a sample for exploratory analyses, and the other section of data is reserved for later confirmatory data analysis.

Registration following analysis of the data. As of the date of submission, you have accessed and analyzed some of the data relevant to the research plan. This includes preliminary analysis of variables, calculation of descriptive statistics, and observation of data distributions. Please see https://cos.io/prereg for more information.

Explanation of existing data	I am using existing data, but have not looked at this data beyond the structure of the dataset (ie, which variables it includes).
Data collection procedures	See (Juice & Fahey 2019) for details.
Sample size	See (Juice & Fahey 2019) for details.
Sample size rationale	NA
Stopping rule	NA - sampling stops at the end of the transect.

Variables

Manipulated variables

- Calcium level (either calcium is added or it is not - two levels)

Measured variables

The measured variables I will analyze are:

- Stem dry mass (grams)
- Leaf dry mass (grams)

Indices

NA

Analysis Plan

Statistical models

A two-tailed t-Test will be performed to look for differences in average stem mass and average leaf mass between calcium-treated and reference site seedlings.

Transformations

For the "watershed" variable, I will recode the "W1" level to "treated," for clarity.

Inference criteria

Data exclusion

I will not exclude data from the analyses.

Missing data

Rows missing for data for stem and leaf dry mass will be removed for the respective t-Tests (eg, a row with missing stem dry mass but not leaf dry mass will be removed for the stem dry mass t-Test, but will be kept for the leaf dry mass t-Test).

Exploratory analyses (optional)	NA

Other

Other (Optional)	NA

References