

Final Project Report

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Abstract

Introduction and Data

[introduction on thistle/dispersal/tv]

The data was collected during a field experiment which crossed warming and mowing treatments. There were ten blocks, where each block subset into two plots - one warmed treatment and one ambient. Within a plot there are three positions, one for each mowing treatment. Ten seeds were planted at each position. One flower head was harvested from all individuals that survived to harvest date. Seeds were collected from individual flower heads and subsequently tested in a drop chamber. Seed drop tests were repeated until two drop times were recorded within 0.1 seconds. With these data, we want to assess the variation in drop time of seeds from plants under warming and/or mowing.

With this data, we will address three main research questions:

1. Is seed terminal velocity predicted by seed shape parameters?
2. To what extent do warming and mowing treatments change seed terminal velocity?
3. Can changes in terminal velocity by treatment be explained by changes in seed shape parameters?

Research Question 1

Research Question 2

The following analysis will quantify the extent to which seed terminal velocity changed under warming and mowing treatments. Figure 1 shows the mean of each treatment. There are fewer points for late mowed plants, as many of them died due to the mowing treatment. To assess whether warming and mowing treatment significantly changed terminal velocity we used ANOVA models. We log-transformed terminal velocity to compensate for skewed right distribution of the terminal velocity data and significant deviations from error normality (Figure 2).

Using log-transformed terminal velocity, we use two methods to identify what is the most appropriate model to describe changes in terminal velocity based on the treatments.

Research Question 3

Discussion

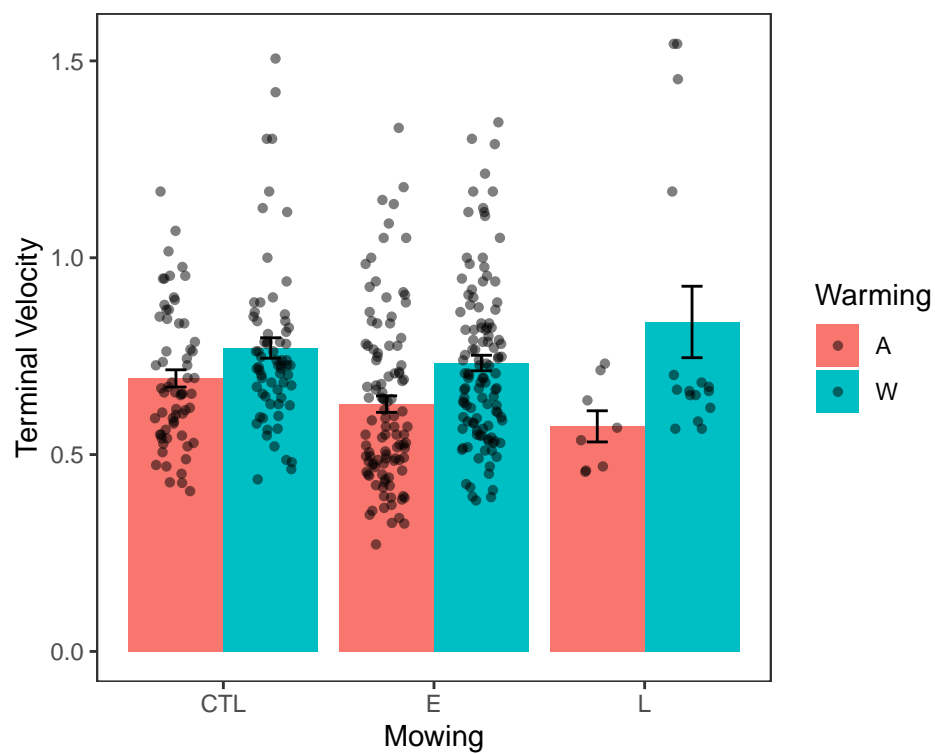


Figure 1: Terminal velocity for plants grown under warming and mowing treatments. Height of bar shows group mean, and error bars show one standard error. Actual data shown with black dots.

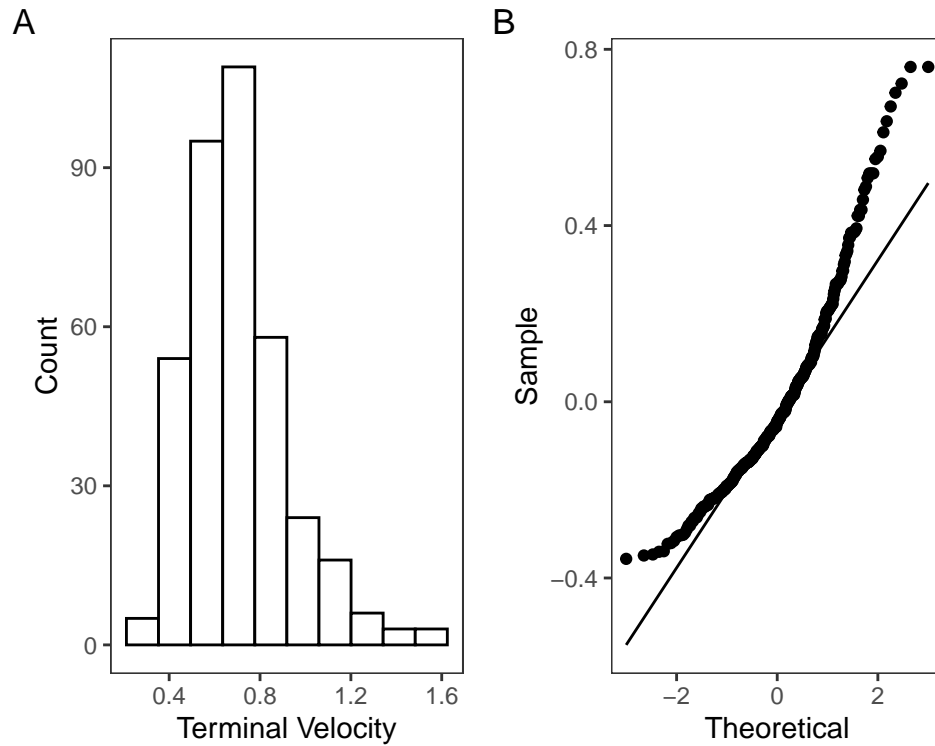


Figure 2: Justification for transformation of terminal velocity. Histogram of terminal velocity (A) and Normal-QQ plot of linear model, with both warming and mowing predictors.

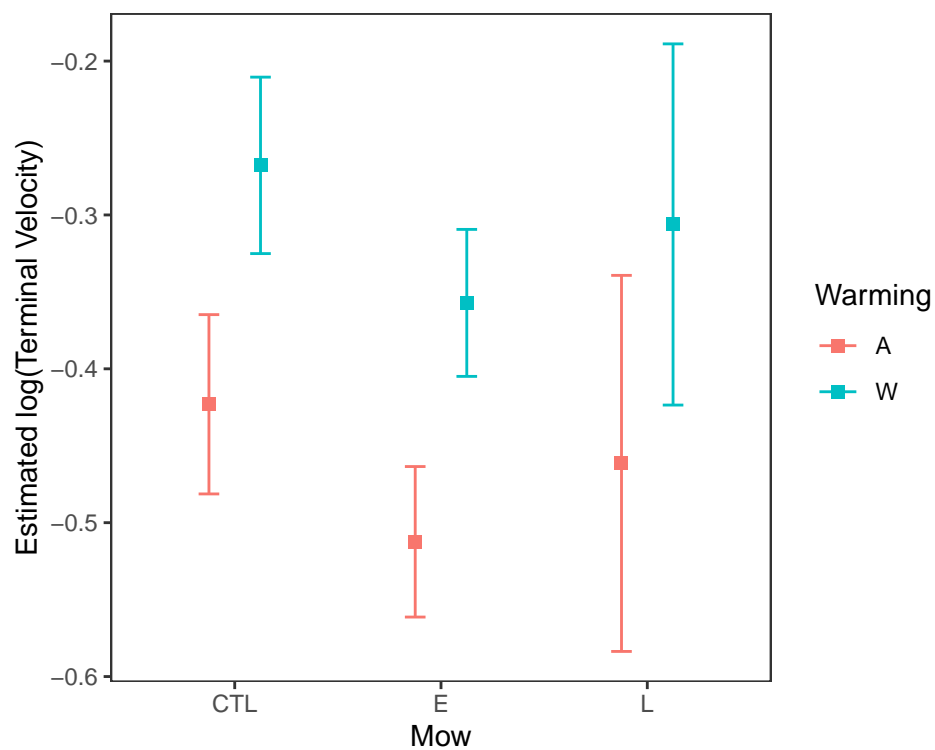


Figure 3: Results of best fitting ANOVA model, which included both warming and mowing as predictors. Square dots show mean predicted value and error bars show 95% confidence intervals.