

Data Explained - The Tipping Point Data Puzzle

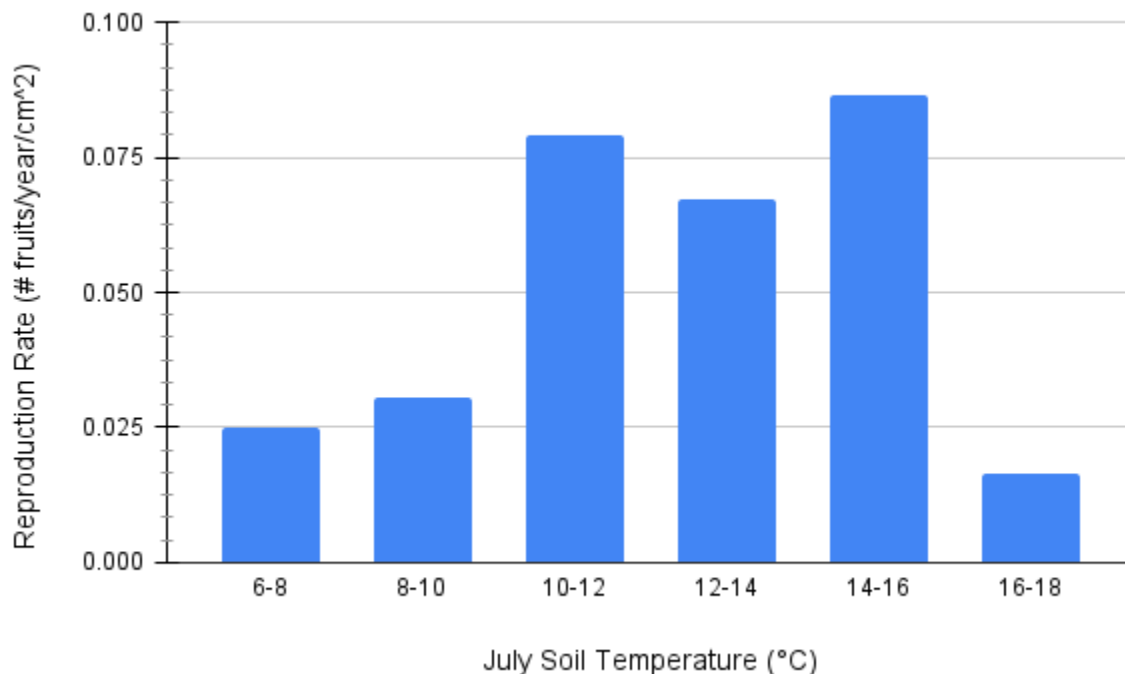
Scientists featured in *The Tipping Point*:

- [Megan DeMarche](#)
- [Dan Doak](#)
- [Bill Morris](#)

About the data:

For more than twenty years, scientists (including Megan, Dan, and Bill) have been measuring the vital signs (reproduction rate, growth, survival) of moss campion plants from four field sites across a latitudinal gradient (New Mexico to Alaska). The data displayed in *The Tipping Point* (see graph below) represents the average reproduction rate (data from all four field sites used to calculate this average) within specific temperature ranges over this twenty year period.

Reproduction of Moss Campion Plants vs. Average July Soil Temperature



Frequently asked questions:

- What are the units for moss campion reproduction rate? # seeds/year/size of plant?
 - The units are the number of fruits / year / size of plant. Size of plant is calculated as the area of the cushion. Number of fruits is our measure of reproduction because we're unable to count the total number of seeds in all fruits, but plants typically make ~8-14 seeds per fruit.

- Why do the data focus on July surface soil temperature (upper 2 cm) and not other variables (such as precipitation) that might impact the moss campion reproduction rate?
 - That's a great question! Because this is an observational study, as opposed to an experiment where we control or manipulate a single aspect of climate, we know that there are multiple aspects of the climate that vary from year to year. This includes different aspects of temperature (e.g., July average temperature which we use here, but also May average temperature, or July maximum temperature, etc.) and measures of precipitation like total snowpack, timing of snowmelt, and precipitation during the summer. The way we have approached this problem is to use our understanding of the biology of the species to narrow down to a small list of climate variables that we think are likely to be important. We focus on temperature and precipitation because they are important for plant growth, and we focus on climate in the month of July because this is when plants are growing and reproducing most actively. Then, we have used data exploration to compare how well these climate variables explain performance. In general, we've found that July temperature is a strong predictor of plant performance, more so than aspects of precipitation. However, in our formal analyses of these data (like scientific publications), we usually include data on precipitation in our statistical analyses as well.
- Would it be possible to have a CSV file of the data that were included in *The Tipping Point* graph?
 - [This CSV file](#) is the average of the yearly values – in other words, the values corresponding to the heights of the bars in the barplot.