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SAS Data Analysis Proposal for Stat 135

Abstract:

I propose an analysis of bumblebee data that I've collected over the course of my PhD. I've recorded the frequencies of bumblebees vibrating while collecting pollen (termed *buzz pollination*) on a variety of flowers throughout the Arnold Arboretum. This previous work suggests that many factors can influence the frequency (in Hz) of vibrations during pollination. During this summer, I've collected another data set, recording additional variables that may affect buzz pollination frequency. I will analyze this new dataset to investigate possible questions that I could not answer with my previous data

- Does the buzz frequency change as the bee ages?
- Does an individual bee change its buzz frequency on different flowers?
- Does local temperature and humidity have an affect on buzz frequency?

Background:

Bumblebees and some other wild bees engage in a special type of pollination that honeybees cannot perform. Some flowers store pollen in poricidal anthers – anthers that are shaped like tubes, with only small pores from which pollen is released (Figure 1). To get pollen from poricidal anthers, bees engage in buzz pollination - using their flight muscles to vibrate their bodies while grasping the anthers with their legs and usually their mandibles. The bees' wings don't flap while they are buzz pollinating, but rather remain folded over the abdomen.



Figure 1. The flower of Bittersweet Nightshade (*Solanum dulcamara*). The ring of 10 pores near the center of the flower release pollen from the tube-like anthers.

Dataset: Buzzes_2014_08_29.csv

The data I will be using is a very raw dataset. The responding variable that I will analyze is the buzz frequency (which has already been placed in the dataset). The rows that are completely missing are bad recordings that need to be dropped. I will drop the bad / missing data, and then conduct a multiple regression to see if buzz frequency is correlated with any of the environmental variables. This will require me to calculate an average buzz frequency for each individual bee. Next, I will look at individual bees, and see if their buzz frequency changes over the course of their lives. I will conduct further statistics research to determine the correct way to analyze this data.