Using Big Data to Examine Host-Parasitoid Interactions
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Introduction
The experiment and data collection were conducted through the Department of Integrative Biology at the University of California, Berkeley.

The main motivation for the research was to assess the effect of micro-environment and dispersal on the development and establishment of Rhopalomyia californica on its host plant, Baccharis pilularis.  

The galls that were collected from the experiment were later dissected. However, the dissection data was neither analyzed nor published. The first task therefore was to process the data and make it ready for analysis.

Using R for Data Management
• R is statistical freeware used for analysis and fitting models  
• Software used to complete the data management aspects of the project  
• Sort data by a variable or view certain galls based on a common characteristic

One of the most important parts of the data management process was the use of metadata.

• Metadata
  Creation of additional datasets that provide more information about the entire dataset.
  • match() function
  Adds information from the metadata to the data by matching an identifier between the two sets of data.

Challenges and Difficulties
The data management stage of the project consisted of various tasks necessary to clean the data. There were different challenges faced during this step.

Issues
1. Inconsistent entries for variables (i.e. ‘pink’ written as PINK, pink, p, pi, etc.)
2. Typos made during data entry
3. Truncation of galls
4. Galls missed during appropriate collection date

How Issues Were Addressed
1. Metadata and the match function used to make substitutions.
2. Handwritten notes utilized to double check entries
3. Incorporate information at analysis stage
4. Complete analysis with and without these galls to see their effect

Preliminary Findings

<table>
<thead>
<tr>
<th>Plot Letter</th>
<th>Count</th>
<th>Density</th>
<th>Total Insects</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLP1 A</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>BLP3 B</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>BLP4 C</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>BLP5 D</td>
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<td></td>
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<tr>
<td>BLP6 E</td>
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<td></td>
<td></td>
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<tr>
<td>CGP1 F</td>
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<td>CGP2 G</td>
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<td>CGP4 H</td>
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<td></td>
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<tr>
<td>CGP5 I</td>
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</tbody>
</table>

1. We are investigating the distribution of gall ages (in weeks) at BLP and CGP.
2. From the above figure we notice that while distribution of ages is similar at the two sites, BLP had a lot more galls than CGP.

Future Directions

• Learning more about the relationships and interactions between the populations through time series analysis
• Comparing caged vs. uncaged environments
• Determining the effect of gall truncation
• Simulate theoretical ecological models and compare to populations observed in the data
  • Nicholson-Bailey
  • Continuous vs. discrete variables
  • Dynamic models and state-space models

Sources