

Flight Performance of *Jadera haematoloma* as a Function of Temperature, Relative Humidity, and Age

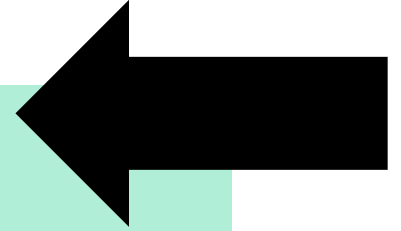
Anastasia Bernat

Two Main Test Groups

1. Testing Field Bugs (Preliminary Extreme Trials)

2. Testing 1 Generation Down of the Field Bugs (Age-Controlled Extreme Trials)

3. Timeline & Materials



Preliminary Trials

A priori information:

Min temperature (T) in Florida = 18.8 C (Tallahassee, Feb),
Min relative humidity (RH) = 47% (Orlando, April, afternoon)

Max temperature (T) in Florida = 43 C (Monticello, June),
Max relative humidity (RH) = 95% (Gainesville, September, morning)

Source: [Florida Climate Center](#). Temperature Normals & Relative Humidity.

250-300 bugs (20-30 from each pop – 8 populations total) arriving August 13

After bugs are tested for the standard trials, field collected bugs will be tested under this regime: **Temperature treatments at 12, 20, 36, 44 C (at 70% RH). Humidity treatments at 40, 55, 85, 100% (at 28 C). 14:10 (L:D).** There are 8 testing regimes. The last testing regime from the standard flight trials will also apply here (i.e. 28 C, RH 70%).

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- Can do 60 bugs per treatment, each treatment on different days. Ideally, equal number of males and females. Half mainland, half keys populations. *
- If these numbers are too high, I can do 30 bugs per treatment where I'm only comparing the sexes or mainland vs. keys. (Choose one sex or one population). *

Stop testing at 4 PM each day.

* Selection of each subset is randomized



~8-16 days

Preliminary Trial Methods

1. Day before:

- I. Test up to 60 field bugs per treatment. Select equal number of males and females, half mainland and half keys, randomly.
- II. Generate datasheet(s) the day before.
- III. Check paint on bugs.
- IV. Give Gatorade picks.
- V. Leave bugs in 28 C and 70% RH.

2. Testing Day:

- I. Set incubator to a treatment (e.g. 12 T and 70% RH).
- II. Record mass and which females laid eggs.
- III. Give bugs 10-15 minutes to acclimate to the temperature.
- IV. Test up to 60 bugs in one day for that treatment. Follow the same experimental set-up used in standard flight trials.
- V. Count how many eggs a tested female laid and collect eggs if necessary.
- VI. Place tested bugs in the fridge and then in alcohol (except selected eye-laying females).
- VII. End flight testing at 4 PM each day

3. Repeat steps 1-2 for a new treatment (8 treatments total)

Preliminary Analyses

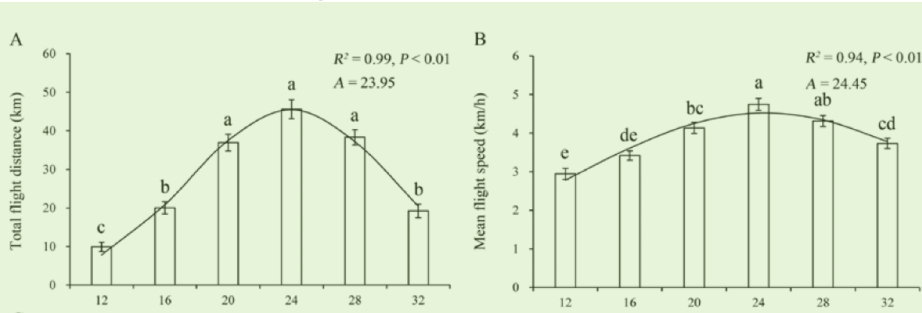
Run one-way ANOVA and nonparametric tests (Kruskal-Wallis, Wilcoxon test, Tukey's HSD test) on flight parameters (speed, distance) for different testing regimes (standard vs. temp and RH settings).

Run binomial and Gaussian glm models to determine which factors are significant in predicting speed, distance, or yes-no flight.

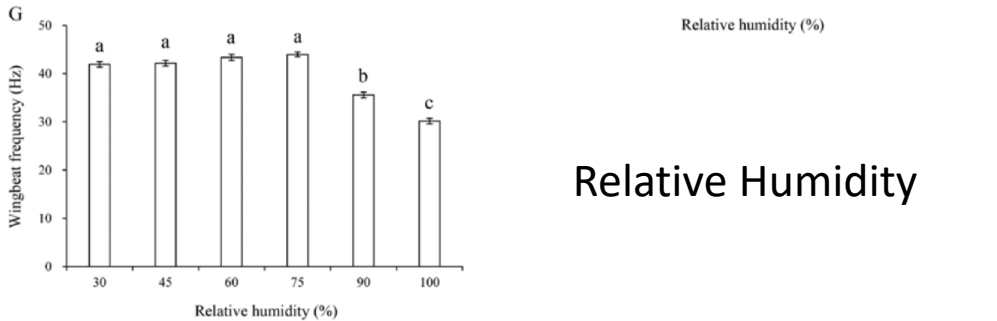
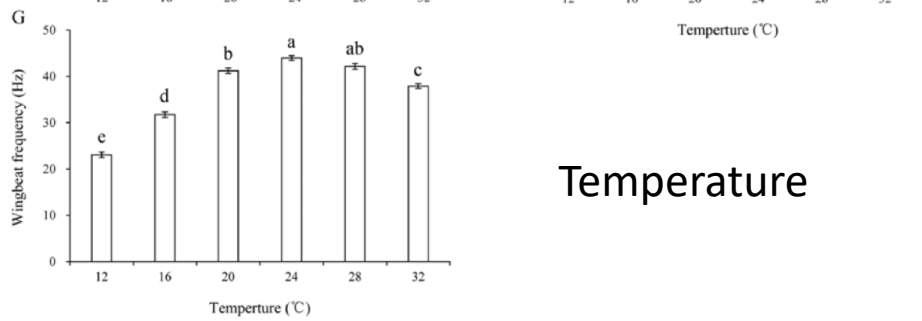
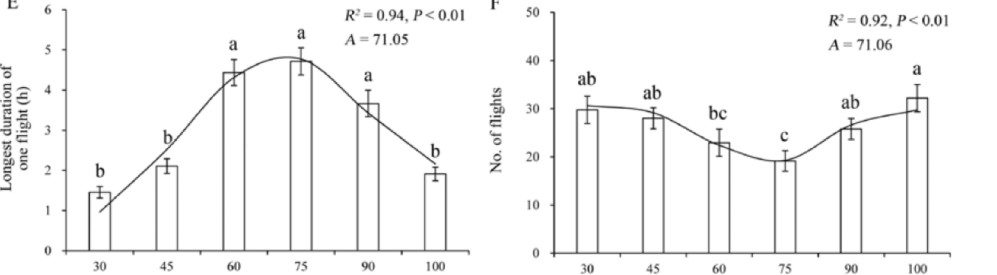
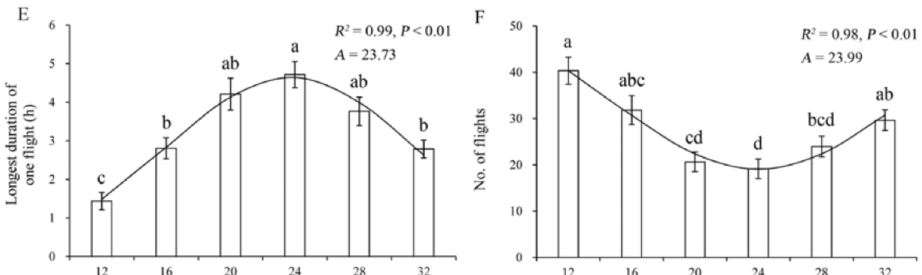
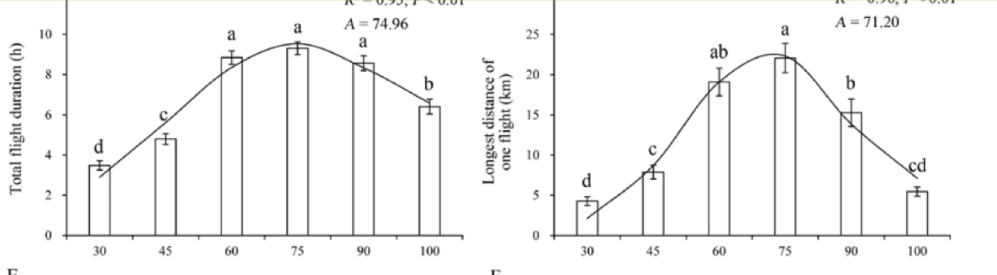
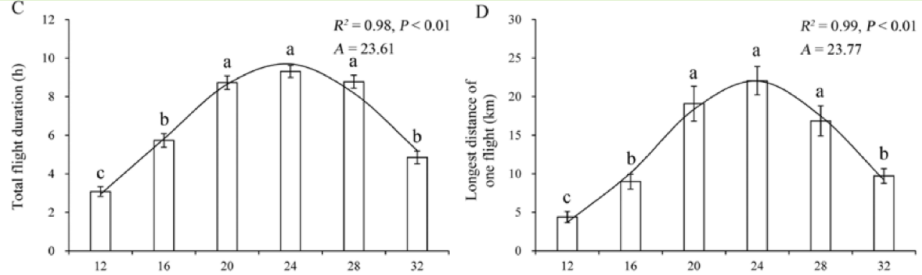
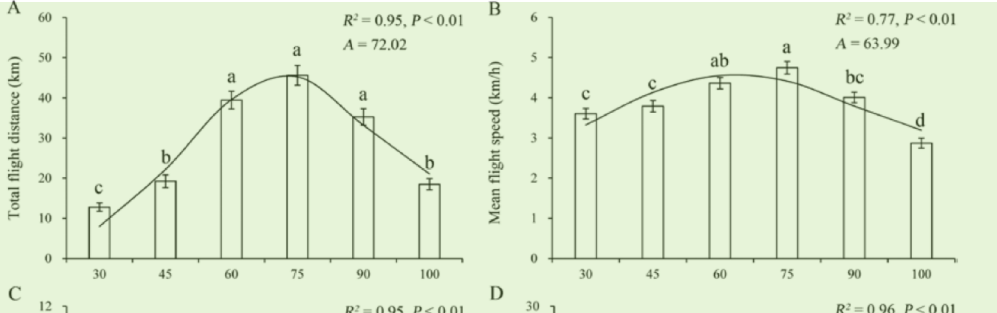
If strong differences exist on field collected bugs, then I have a strong enough reason to believe that they will impact the flight behavior of lab raised bugs. The age of lab raised bugs will be recorded so as to separate age effects from temperature and RH effects.

Preliminary Ex Results

Total Distance



Avg Speed



Temperature

Relative Humidity