

How is egg laying and emergence affected by temperature and resource availability in *Callosobruchus maculatus*?

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Hypothesis

The maximum number of eggs will be laid at an ideal temperature somewhere in the middle of our experimental values with declining amounts towards the extremes. Threshold of emergence maximum with resource availability.

Introduction

The Bean Beetle (*Callosobruchus maculatus*) is an agricultural pest of the tropical and subtropical regions from Africa and Asia. They have a short generation time, making them an ideal model to test ecological factors. Black eyed peas are one of the most common beans that *C. maculatus* uses as a host and were used as the food throughout all the trials. *C. maculatus* has strong sexual dimorphism making it easy to distinguish sex. Females are usually larger and darker in colour than males and have longer abdomens.

Adults live for 1-2 weeks, no food needed. Only made for dispersal and reproduction

Females lay eggs smaller than 1mm(0.75).

Generation time from 4-5 weeks.

Methods

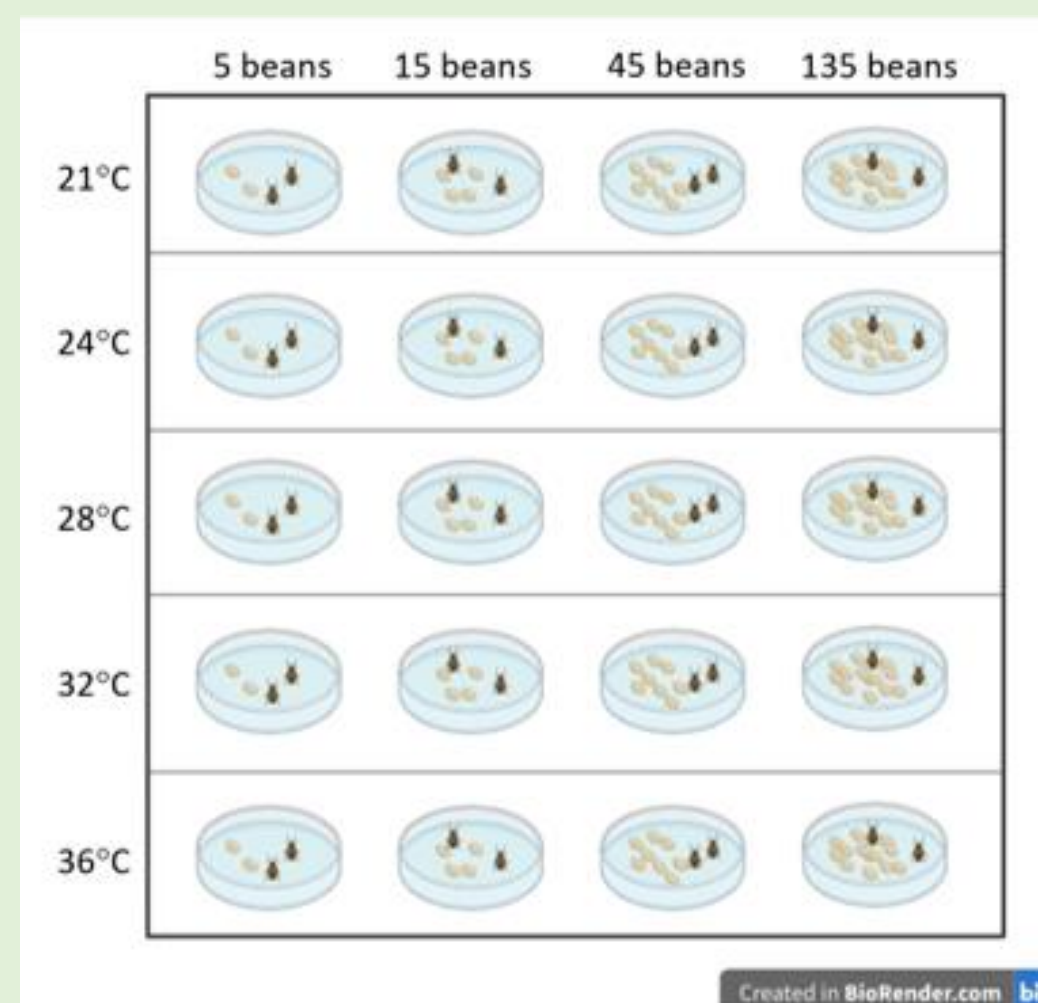
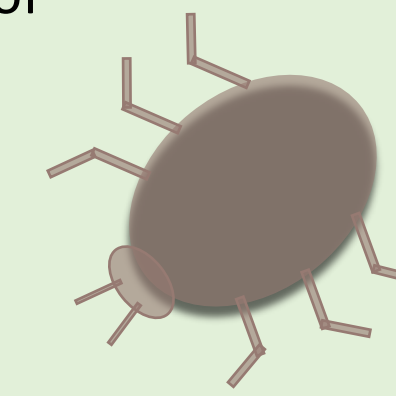


Fig 1. Set up for the experiment.

Beans (5, 15, 45, 135) and one mating pair of beetles in petri dishes are put in varying temp. controls. Parents are removed from the dishes after death. Number of eggs laid are counted, both on and off beans. Around week 5, number of individuals emerged are counted.



Results

The temperature where the highest total number of eggs is laid is 28 degrees, regardless of amount of beans (Fig. 2). However, looking at just one temperature (28 degrees), the mean number of eggs laid per bean is lower for higher numbers of beans.

The proportion of emerged individuals decreases with higher numbers of eggs per bean (Fig. 3). For the temperature, there was a higher proportion of emerged adults at 32 degrees compared to 28 degrees, and a very low proportion of emerged adults at 36 degrees (Fig 3).

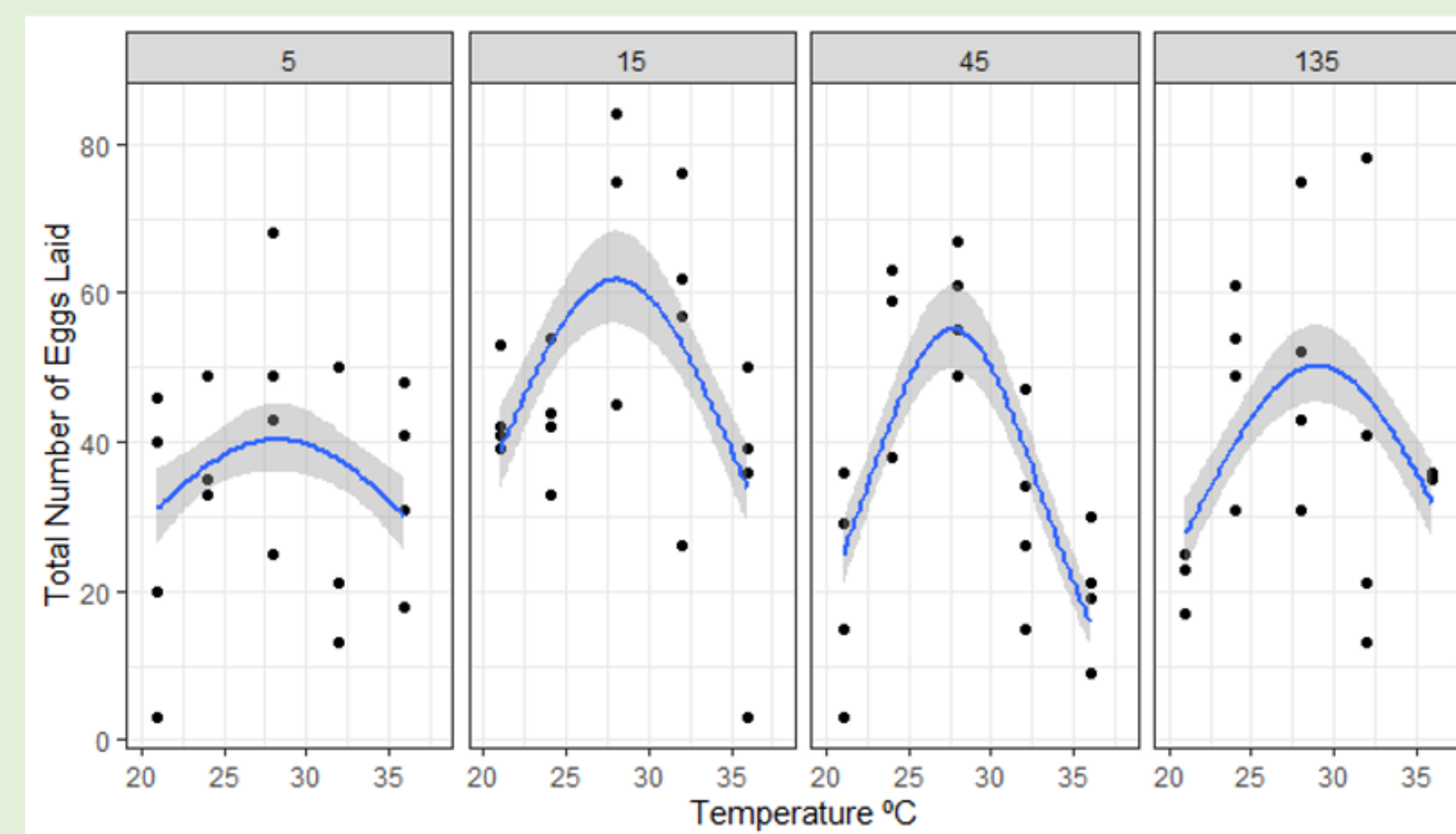


Fig 2. Total number of eggs laid at different temperatures, separated by amount of beans. Using model selection procedures (AIC) we found that the best model for describing the data does not consider the number of eggs.

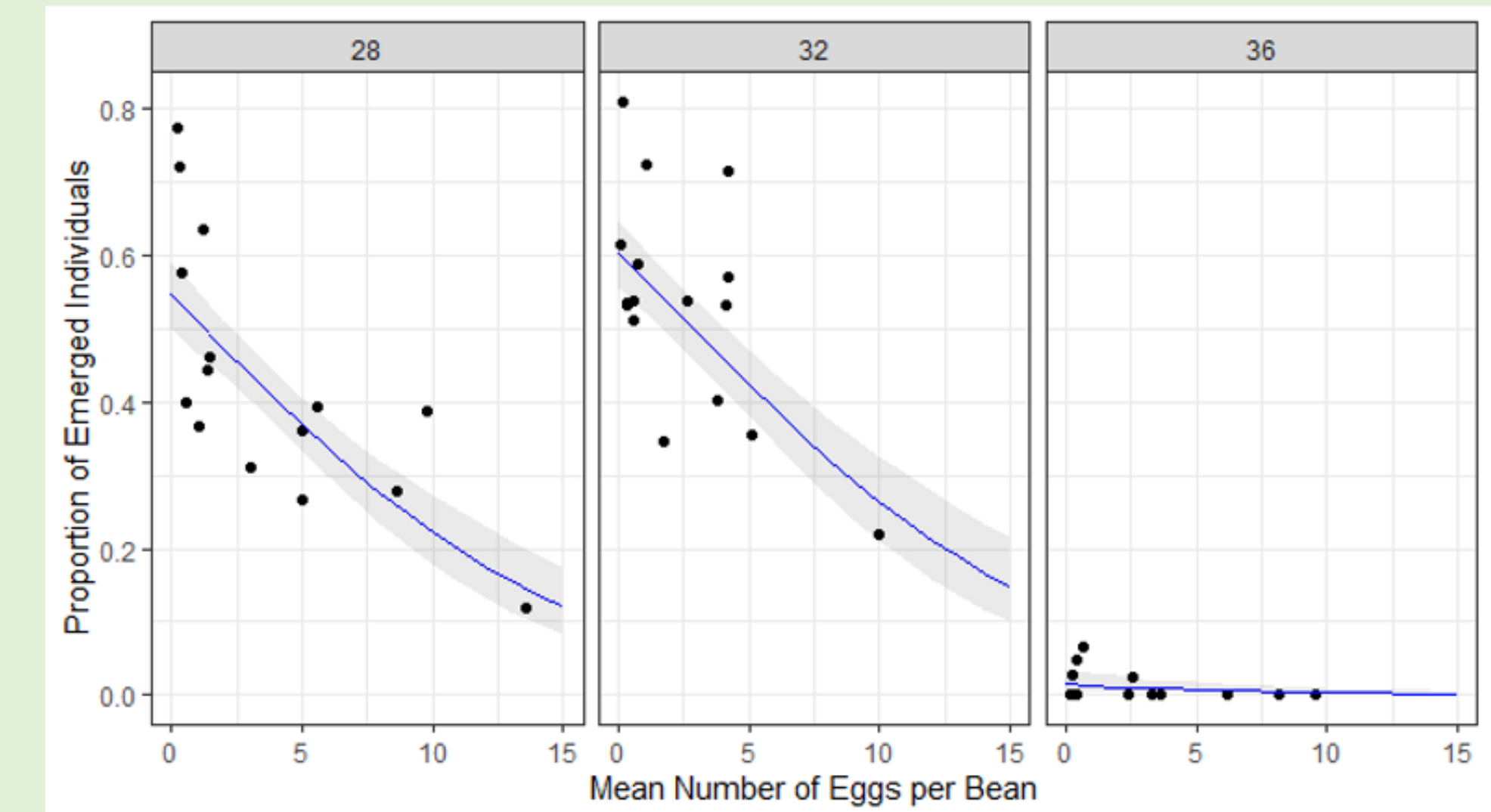


Fig 3. The proportion of emerged adults at different numbers of eggs per bean, separated by temperature. There were no emerged adults at 21 and 24 degrees.

Conclusion

Eggs laid: The total number of eggs laid is not significantly affected by the number of beans. The temperature where the highest total number of eggs is laid is 28 degrees.

Emerged adults: The proportion of emerged individuals decreases with higher numbers of eggs per bean. The highest proportion of emerged adults was at 32 degrees. We had to stop the experiment at week 5, so there were still some eggs that had not yet hatched, so in the future more time should be allowed to let all the eggs to hatch..

