Measure of survival rate and competition of bean beetles

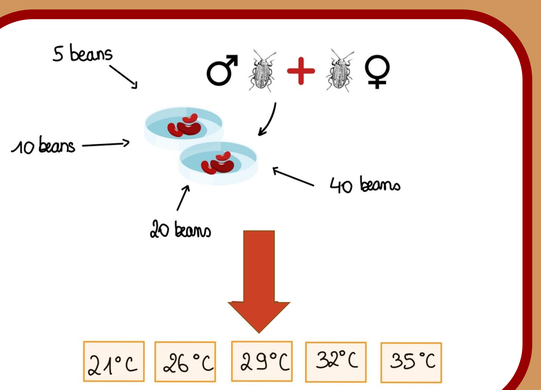
SCAN ME

Hypothesis: **Survival rate of bean beetle eggs and competition varies with nutrition availability and temperature.**

Introduction

- The **metabolic theory** predicts how the metabolic rate controls **ecological processes** at all levels of organization (Brown et al. 2004).
- To test the effect of **temperature** on **survival rate**, we examined bean beetles *(Callosobruchus maculatus)* with different environmental variations.
- **Bean beetles** have a **short life cycle** of 2 weeks which can easily be observed.

Methods



- 3 replicates of each bean amount per temperature.
- Count eggs per dish after 3 weeks.
- Count hatched beetles after 1 month.
- Calculate survival rate and competition index:

$$Survival\ rate = \frac{Number\ surviving\ adults}{Number\ eggs\ laid}$$

$$Competition\ index = \frac{Number\ eggs}{Number\ beans}$$

Prediction

Survival rate will increase with temperature and amount of beans while competition will decrease.

Results

- Dishes without eggs were excluded from results.
- Unimodal model for statistical analysis.

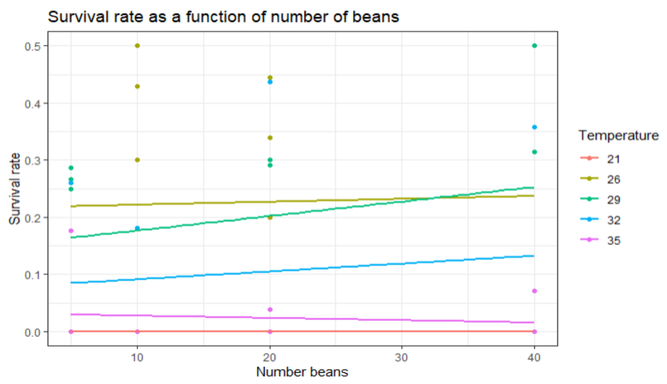


Figure 1: survival rate as a function of number of beans. Steeper slope means increased survival and decreased competition.

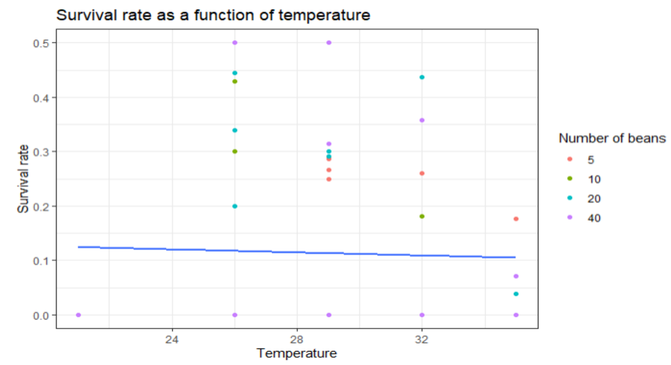


Figure 2: survival rate as a function of temperature.

Discussion

- An increase in the number of beans did not affect the survival rate (Fig.1).
- An increase in temperature led to a decrease in survival rate (Fig.2).
- This differs from our prediction.
- Competition index was tested at different temperatures and bean amounts.
- Neither variable had significant effects on competition.
- Survival slope shifts show change in competition.

Conclusion

- Our results **did not confirm our hypothesis.**
- Survival rate of bean beetles decreases as temperature increases.
- The metabolic theory cannot be applied to our results.

References

Brown, J.H., Gillooly, J.F., Allen, A.P., Savage, V.M. and West, G.B., 2004. Toward a metabolic theory of ecology. *Ecology*, *85*(7), pp.1771-1789.

Credits

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