Age-dependent effects of pathogen exposure and infection in a fungal pathogen

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Research Question

How does host age influence infection outcomes (infection prevalence, time to infection)?

Hypotheses

1. Infection prevalence will decrease as beetle age increases. 2. There are distributional differences in time to infection.

Background

This study investigates the age-dependent effects of the fungal pathogen Beauveria bassiana on Tribolium castaneum, commonly known as the red flour beetle. This pest is a major threat to stored grains and flour, causing significant economic losses in agriculture. Age is a critical factor influencing immune responses; younger and older beetles may react differently to infections, potentially affecting population dynamics and disease spread. By understanding how host age impacts infection rates, severity, and mortality, we aim to enhance biological control strategies using Beauveria bassiana, thereby improving pest management practices and minimizing economic losses in food storage.

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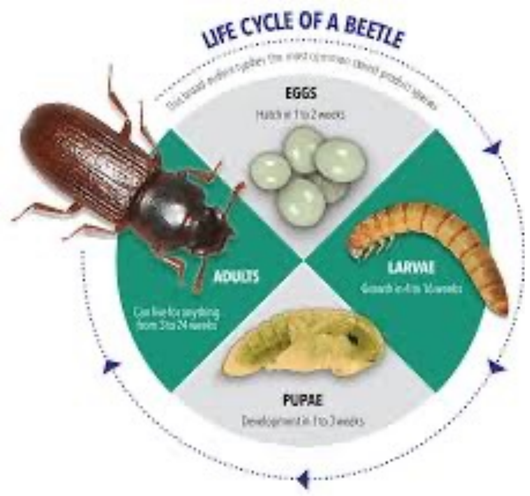
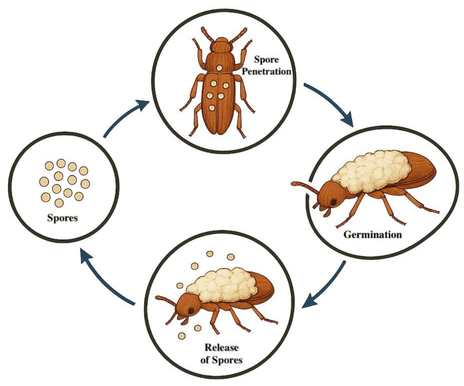
T. castaneum and *Beauveria bassiana* Life Cycles





Methods

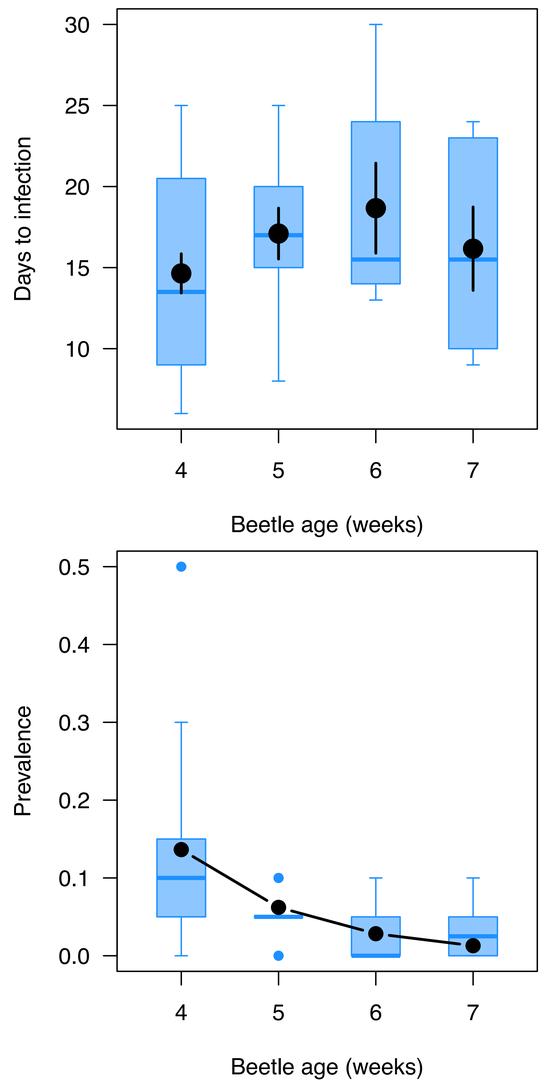
We used T. castaneum beetles aged 4 to 7 weeks, organized into ten replicate containers with 20 beetles each. The protocol included:
1. BB Solution Preparation: 5 g of Beauveria bassiana in 5 mL DI water.
2. Inoculation: 0.5 µL of the solution was applied to Kimwipes in each container for a 48-hour exposure, with re-inoculation after 24 hours.
3. Post-Exposure Monitoring: Beetles were moved to containers with 18 g of flour-based media and monitored daily for mortality and fungal growth.
This process allows for assessing age-related differences in infection dynamics in T. castaneum.

Infection Diagnostics

Before Infection

After Infection

Conclusion and Future Work



We conclude that infection prevalence decrease as beetle age increases. We found no distributional differences in time to infection given our data. Further experiments could be conducted to include beetles of later age ranges.

References

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