

Insect Eavesdropping: Identifying *Dectes texanus* life-stage change in soybean using bioacoustics.



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Introduction

- Dectes texanus* (**Fig. 1,2**), commonly referred to as the Dectes stem borer, is a small longhorn beetle that overwinters in important Kansas crops, including soybean [1].
- Dectes larvae girdle the inner circumference of its host stem (**Fig. 3**), leading to soybean lodging which reduces crop yield [2].
- These beetles spend the majority of their life cycle (**Fig. 4**) hidden within their host crop, making detection difficult [1,3].
- The Insect Eavesdropper, developed by the Bick Lab at the University of Wisconsin-Madison, can be used to detect insect herbivory using bioacoustic recordings [4].

Objective: Detect change from pupa to adult life stage of Dectes stem borer using emerging bioacoustic technology.



Fig. 1: Dectes Larva



Fig. 2: Emergence of Dectes, Photos by Author



Fig. 3: Larval Damage in Soybean, Photo by E. Sur

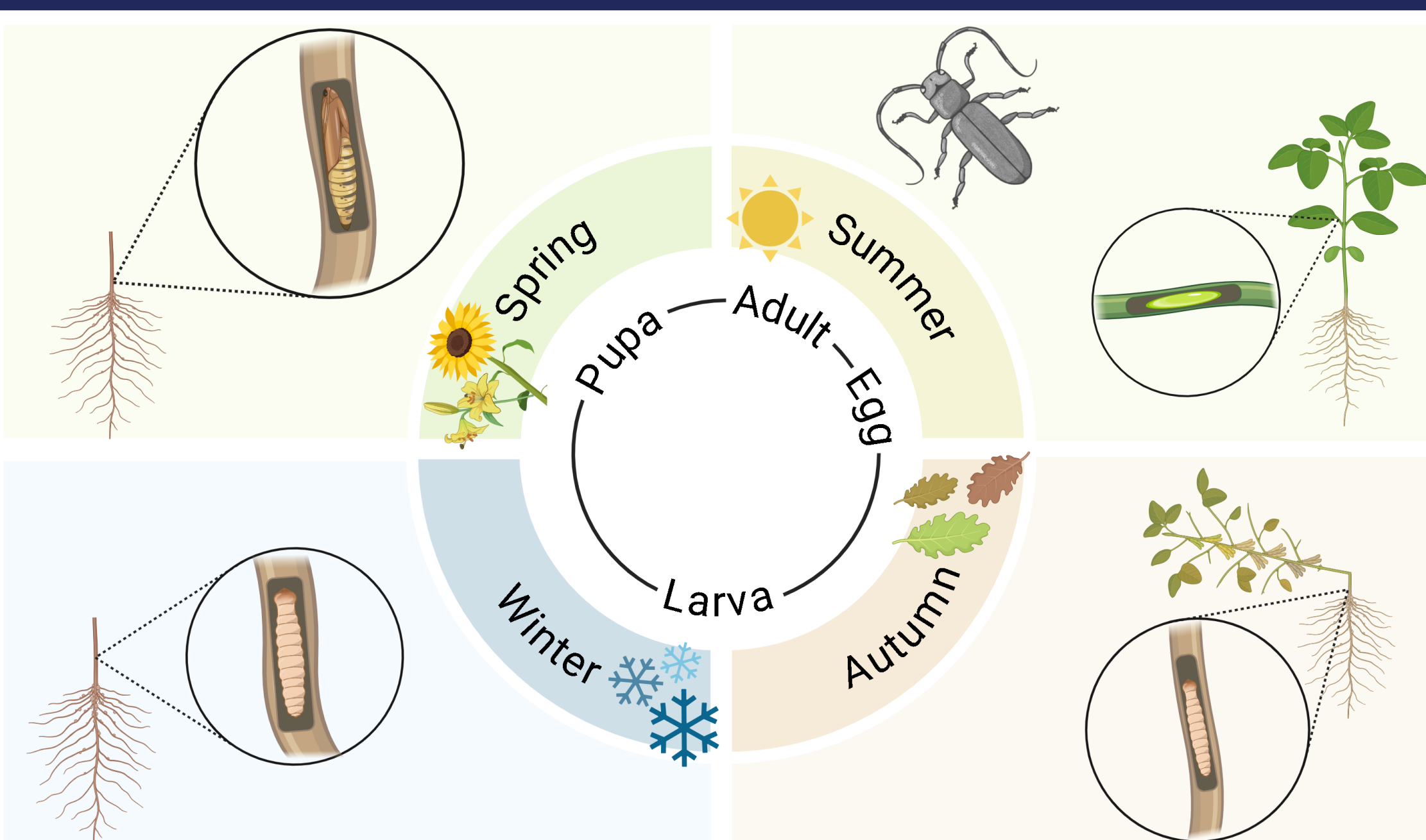
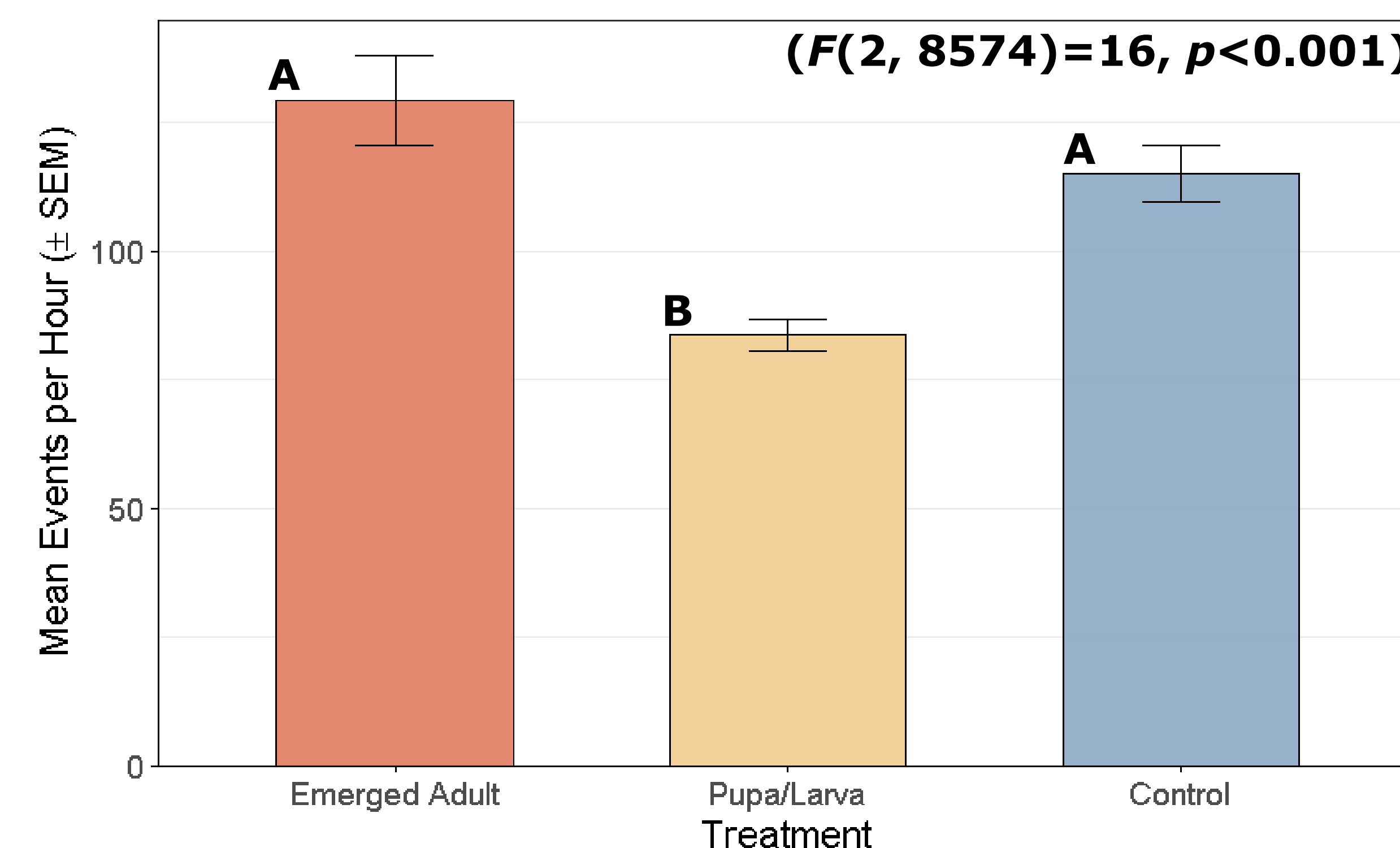


Fig. 4: Life Cycle of Dectes Stem Borer (Adapted by Author from [1,3])

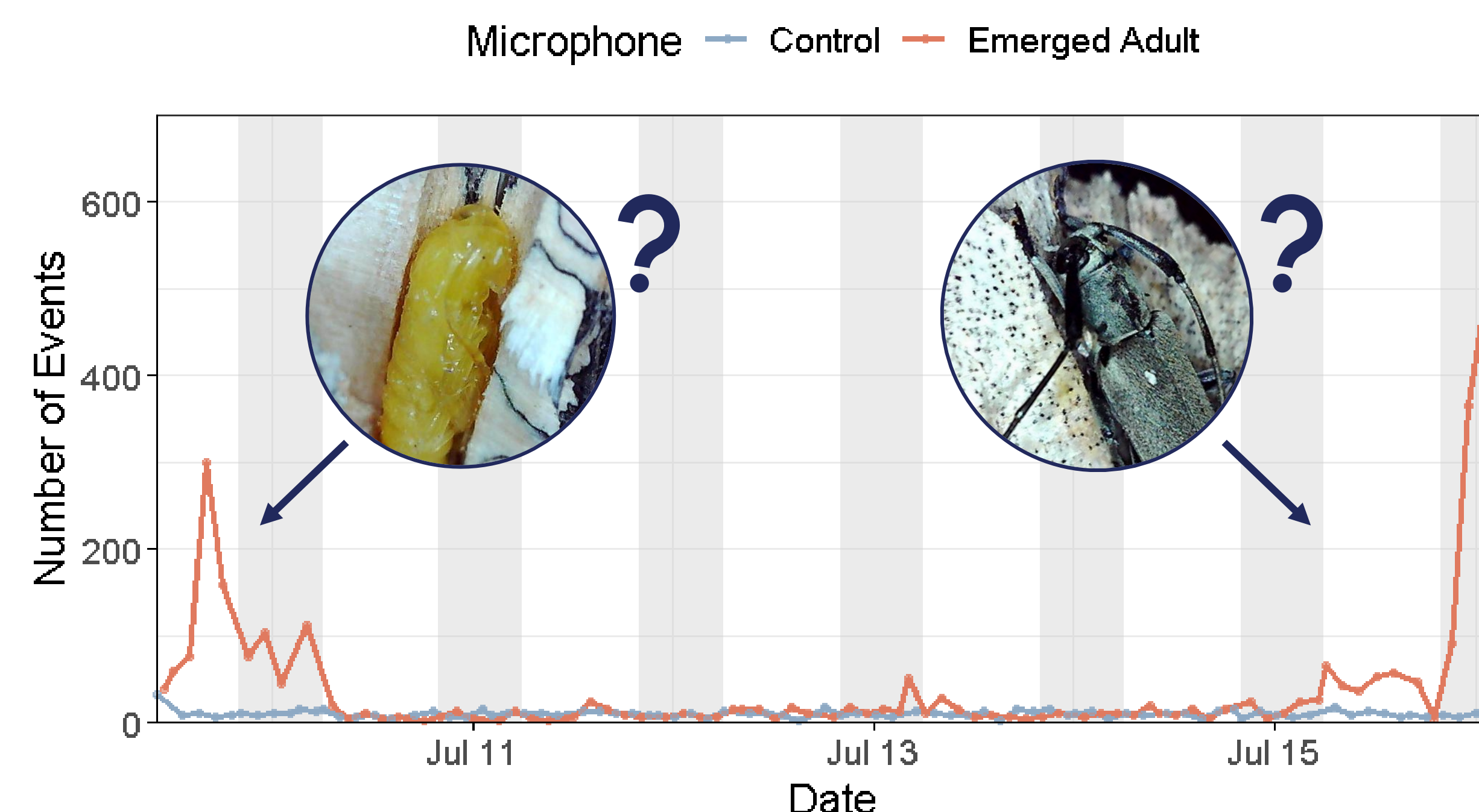
Experimental Methods



Preliminary Results



Result 1: Average bioacoustic events per hour for infested and control stems across four weeks of laboratory trials.



Result 2: Trial 3 acoustic profile of an emerged Dectes vs. a control stem. Dashed red line indicates estimated time of emergence.

Conclusion: Further analysis of Insect Eavesdropper recordings are needed to refine bioacoustic data and isolate the sound of emerging *Dectes texanus*.

Next Steps

Analysis Pipeline

- All data collected will be analyzed through the Bick Lab data quality filter pipeline and used to determine clusters of similar bioacoustic events.

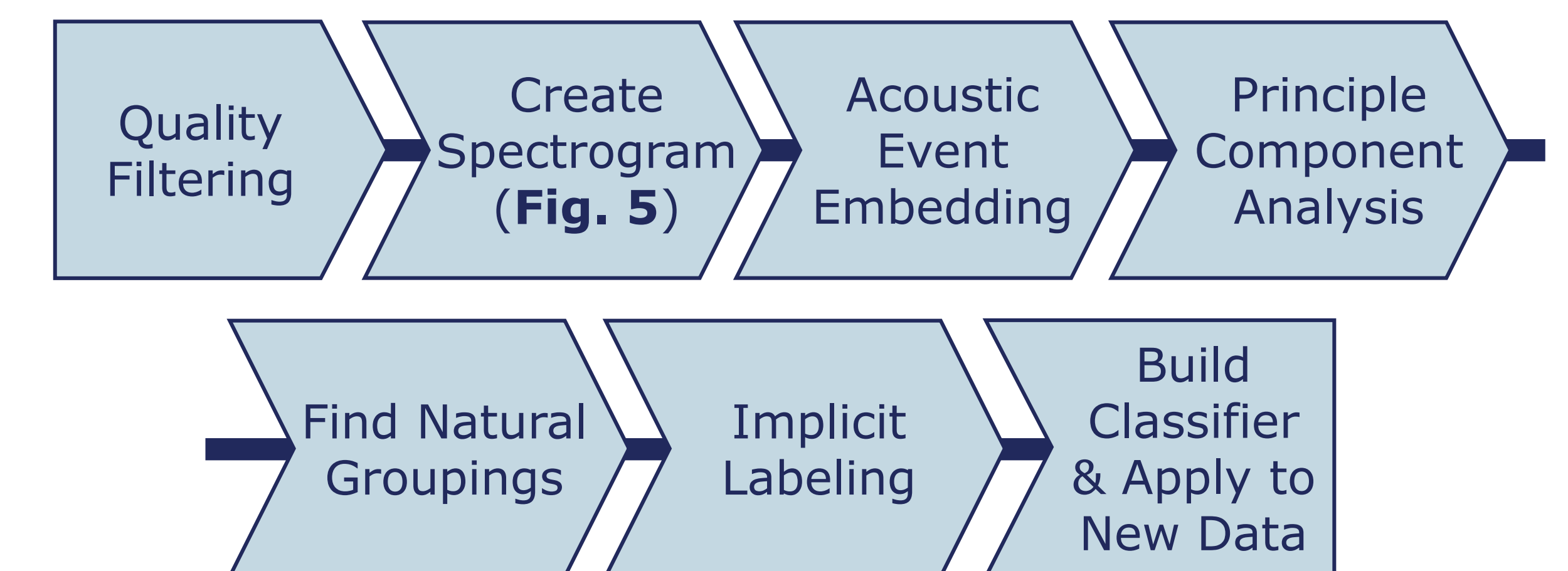
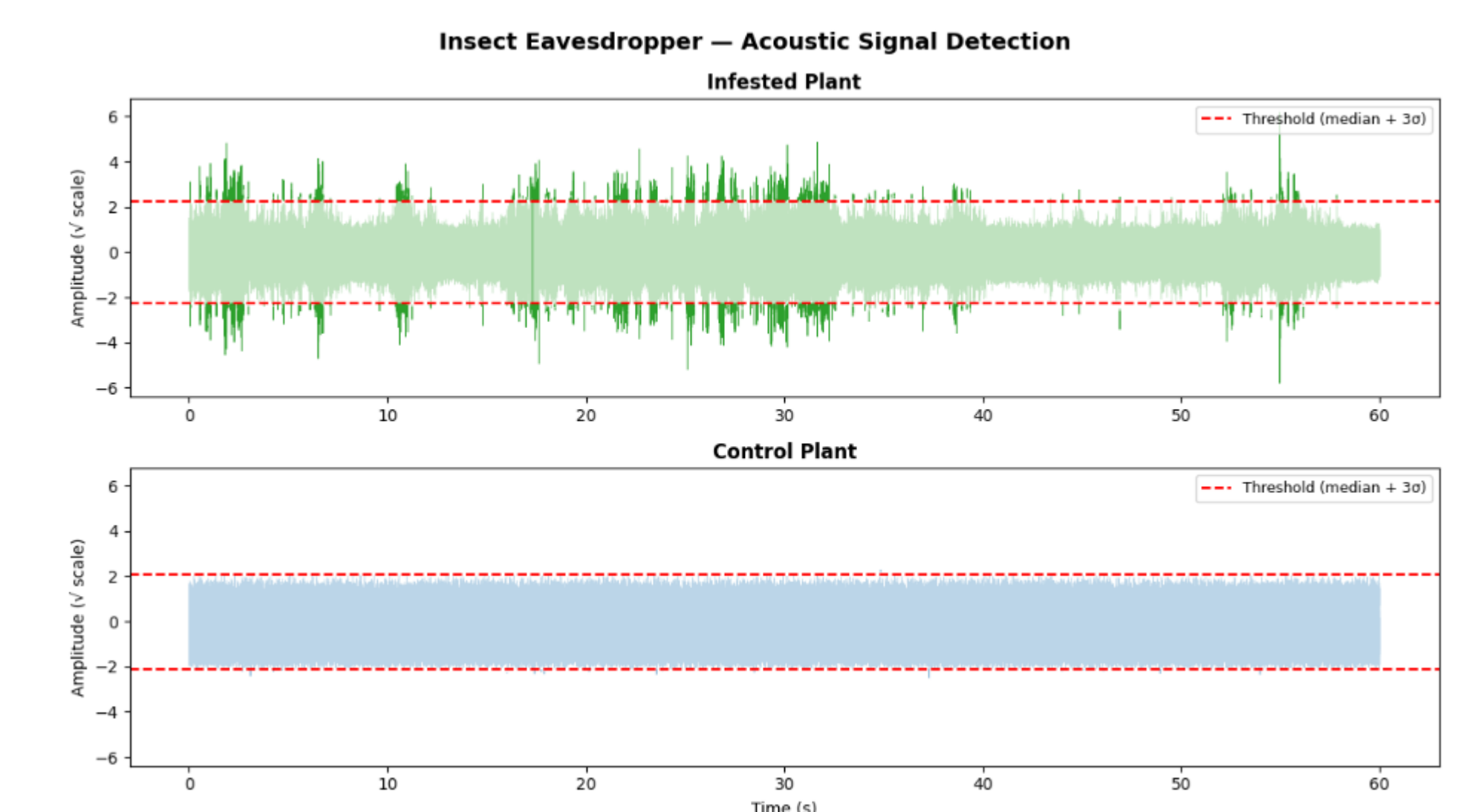


Fig. 5: Example Spectrogram, Courtesy of Bick Lab

Future Research

- Additional data from the remaining weeks of lab trials will be collected to increase the statistical robustness of this experiment. Further experimental variables will be explored in response to current findings.
- The Insect Eavesdropper is emerging research technology. More data collection, analysis, and device development is needed to optimize workflow to allow for widespread application.

References: Graphics created using Biorender.com [1] Michaud, J.P. (2013), Kansas State University Research and Extension [2] Hatchett, J.H. (1975), Ann. of the Ent. Soc. of America 68:2 [3] Valmorbida, Ivair (2025), University of Missouri Extension [4] Bick, Emily (n.d.) Online Digital Entomology Lab

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