# TRANSMITTING GLASSY-WINGED SHARPSHOOTER CALLS TO DISRUPT MATING


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## Executive Summary

The glassy-winged sharpshooter (GWSS), *Homalodisca vitripennis,* (Fig. 1), is an agricultural pest causing disease in grapevines. These insects are commonly known as "leafhoppers" for they jump between plants with the possibility of being vectors of the bacteria *Xylella fastidiosa* that causes Pierce's Disease in grapevines. According to the University of California, Pierce's Disease has caused California an estimate of $104 million loss per year (Tumber, 2014), so it is important to apply this chemical free, pest management method. GWSS are known as vibrational communicators. They create vibrations with their abdominal muscles and receive vibrations through their legs. Previous studies identified key aspects of GWSS communication in order to apply a new pest management method using vibrations as a form of mating disruption (Nieri, et al. 2017). Disruptive mating will allow us to send interfering signals using specialized equipment to the insects and stop them from mating and potentially reduce the population numbers of these pests over time.


Fig. 1

## Project Objective

The objective of this experiment was to determine if the specialized equipment could send out a strong enough vibrational signal throughout an entire tree.

## Project Approach

The GWSS in California has been found to reside in citrus trees. We collected data on nine citrus trees at the USDA (3 large, 3 medium, and 3 small).

We first set up the custom-made shaker (a 2 inch tall, cylinder shaped device) that sends out disruptive vibrations throughout the tree by drilling it into the base. In order to test the shaker transmission, we set up two laser Doppler vibrometers (Polytec PDV 100) that are used for contactless measurement of vibrational velocities. These lasers essential sense frequency shifts from a moving surface (Polytec. 2017). Next, we applied retroreflective tape to our selected points of measurements. This tape is essential to the preparation of laser recordings for it reflects light back to the laser, thus giving us the correct wavelength measurement.

The disruptive mating playback consisted of six GWSS female calls and pure tones. We collected and analyzed our data using a specialized computer program (Adobe Audition CS6). This program acts as a digital audio workstation that displays our data in waveform making it so we can view the frequencies and intensities of each GWSS call.

## Project Outcomes

The main focus for data analysis was to determine how sound travels over distance. The data analyzed was to see when the frequency component of the female signal became indistinguishable from background noise and for the intensity of the pure tones. Although the signals were detectable within trees, it was clear that the signal intensity decreased the further away we got from the emitter

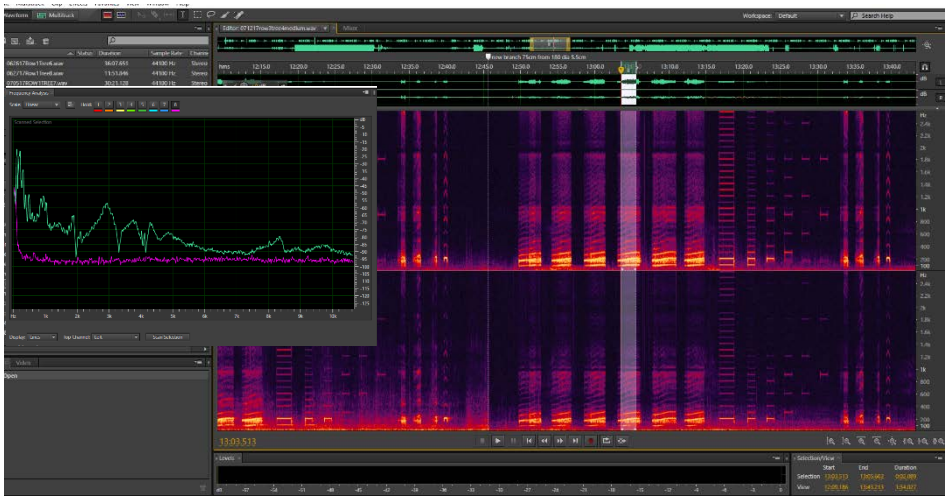
## Conclusion

Results revealed that the signals were detectable throughout all the citrus trees, albeit at reduced intensity with increasing distance from the source. These results provided insights for understanding signal transmission through trees and development of a novel method to suppress pest populations in citrus.

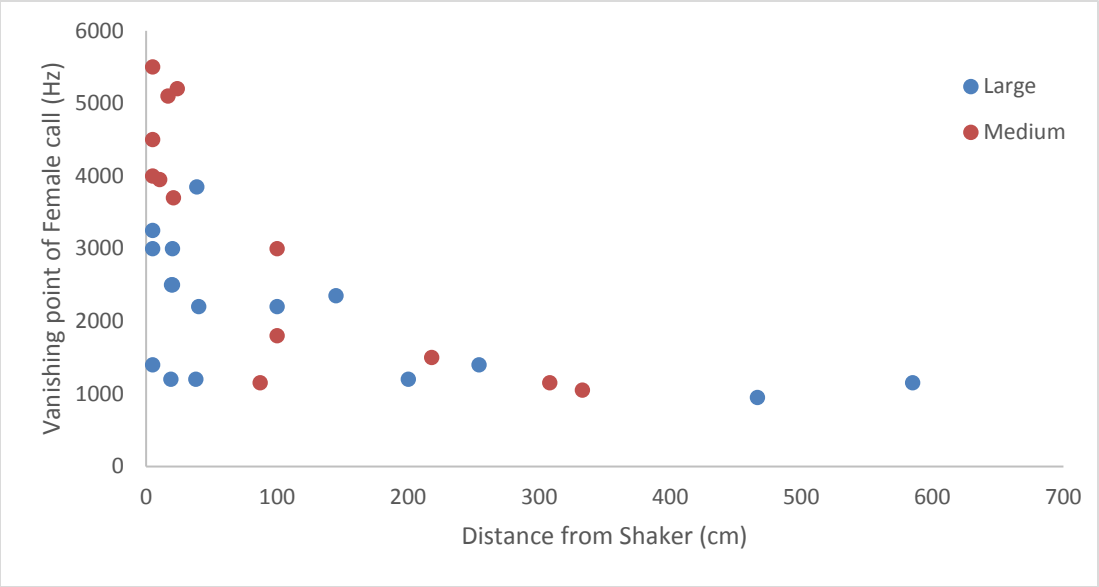
# Appendices

## Lasers positioned and focused at selected measurement point:

## Analyzing calls on Adobe Audition:



**Decreasing signal relative to distance:**



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